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### SUSPENSION AND TRACTION TREATMENT OF FRACTURES IN BASE HOSPITAL WORK.

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MILITARY surgery of today is a product of the present war. The methods of treating wounds in previous wars have been discarded for more efficient ones to meet modern needs. The constant improvement and modification in weapons of destruction result in a great variety of wounds which stimulate the introduction of new methods of treatment.

As a result of the great development of the use of high explosives and the number of pathogenic bacteria in the soil on the western front, the present war presented at its outset new problems in the care of fractures, demanding new methods of treatment.

Briefly these new conditions are:

1. Great laceration of soft parts and comminution of bone.

2. Frequent injury to nerves.

3. Extreme virulence of infection of the majority of wounds which necessitate prolonged treatment, wet dressings, and immobilization.

A method of treatment or apparatus to enable us to care for such injuries should fulfil certain requirements:

1. There should be easy access to the wound and the entire limb, so that the wound can be dressed and the limb inspected without disturbing the fracture.

2. The patient should be able to move about in bed and have the usual nursing care without interfering with the alignment of the fragments of the bone.

3. Good circulation should be maintained in the injured limb and all edema avoided.

4. Mobility of the joints of the limb must be maintained throughout treatment to prevent ankylosis.

5. The apparatus should be applicable to any fracture, enabling one to obtain sufficient traction to prevent overriding of fragments, to maintain correct alignment and to rotate the broken bones in their proper planes.

Before discussing the shortcomings of immobilization of fractures in war wounds with the types of splints and plaster casts in vogue in civil practice, a word should be said regarding bone plates, Parham bands, and wires for maintaining bone fragments in reduction. These methods, especially bone plating and

wiring, have been used much more than they merited in the present war, but of late they have been used only in rare cases. Plates are dangerous as the screw holes open new avenues of infection to the medulla. Parham bands and wires about fragments of bone, by constriction, hasten necrosis of the ends, in the presence of infection, become loose and are then of no value.

In regard to splints: any form of splint which depends upon the use of tight straps for its proper application, constricts the limb, interferes with the already poor circulation and increases edema. Apparatus having lateral and posterior splints has to be completely removed to dress the wound or inspect the limb, at which time alignment of fragments cannot be maintained. The usual nursing care with such apparatus disturbs the fragments. The splints cannot be applied satisfactorily on account of large dressings. Ankylosis is a common sequela as the joints are immobilized. Strong traction is required, as much of the pull is lost by the limb resting upon the bed.

Plaster casts are difficult to apply in the type of fractures seen in base hospital work. The wound must be carefully bridged with iron rods to expose the wound and permit dressings. Casts are soon soiled and become foul from the wet dressings and discharge from the wounds; and owing to the small area exposed it is impossible to know if sepsis is spreading.

To eliminate the difficulties met with in the treatment of fractures in base hospitals the Suspension Traction method was introduced at about the same time, September, 1914, by Hey-Groves of London and Joseph Blake, who was then at the American Ambulance Hospital at Neuilly. Hey-Groves used this method first for fractures of the femur and Blake for fractures of the humerus.

Before describing in detail the Suspension-Traction method as it is applied at present, it may be of interest to take up briefly the development of this method from the time of its introduction to the present.

The earliest mention in the literature of its use was an article published in 1826 by Dr. Smith, Professor of Surgery at Yale. He had been treating fractures of the femur by this method since 1810.

Following Professor Smith's pioneer work, his son, Nathan R. Smith, published an article in 1830 on a new splint for suspending the lower leg. This was made of two boards, one for the leg, the other for the thigh, moulded into the form of troughs with bandage stretched across the top, on which the leg rested. This splint was jointed at the knee and the lower half suspended in bed from barrel hoops. Several years later he devised the anterior wire splint for suspension, to which his name has since been attached and which has frequently been mentioned as the first suspension splint. (See Fig. 1.)

In 1856 Damoiseau of Paris published an article describing a bed for the suspension-treatment of fractures. This was rather complicated and worked by means of windlasses and pulleys. One of these beds I saw in use in a French hospital. In 1857 Denucé of Bordeaux described a method of traction which resembled the Liston side splint and a suspension apparatus similar to the Bradford frame, which had been in use in France for some time.

During the Civil War, Hodgen introduced the splint which has since borne his name, and which with adaptations from the Thomas splint is used in a great many base hospitals in the present war. The original Hodgen splint (see Fig. 2) was a Smith anterior splint spread out to permit it to slip down over the leg. The leg was suspended in the splint by bandages passing under the leg and pinned to the lateral rods of the splint. It was bent slightly at the knee and suspended by cords attached to the ceiling. Traction was obtained in part by adhesive bands attached to the leg and stretched over the foot of the splint and also by the pull of the suspension cords, which were attached above the bed in such a way that they exerted a pull at an oblique angle towards the foot of the bed.

There is very little in the literature about the early use of the Thomas splint. In 1878 Rushton Parker mentions it as a common method of treating fractures.

In connection with methods of suspension and traction, the Verity frame and the St. Pierre Gibson splint should be mentioned, though neither apparatus ever came into popular use. Both were introduced about 1880. With the Verity frame (Fig. 3) the entire body was suspended, while traction was made upon any limb desired. The Gibson splint (Fig. 4) was a rather ingenious device made of iron rods by means of which the leg below

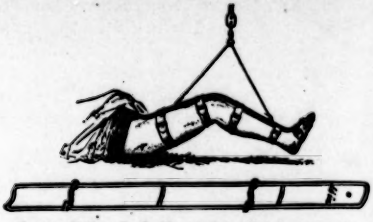

Fig. 1.—Nathan R. Smith anterior splint for suspension.

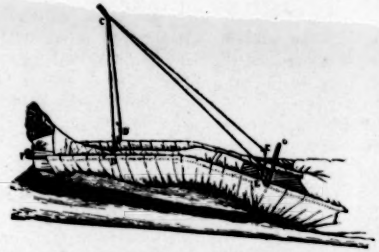

Fig. 2.—Original Hodgen suspension splint. Note the slight flexion at the knee and oblique pull on the upper part of the splint.

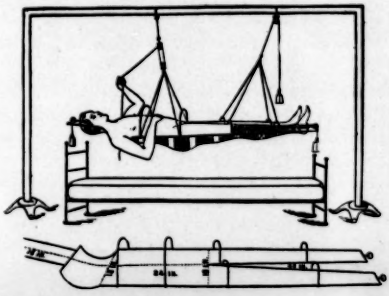

Fig. 3.—Verity frame.

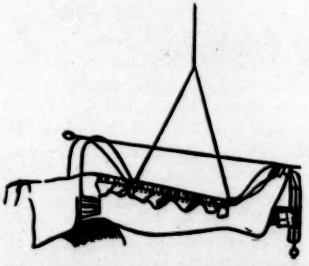

Fig. 4.—St. Pierre-Gibson splint for suspension, extension and counter extension of the leg.

Fig. 5.—Florschütz method of suspension and traction.

the knee could be suspended while traction and counter-traction were made with the splint.

Except by a very few surgeons the Hodgen splint and suspension methods of treating fractures were abandoned from the close of the Civil War to the first months of the present war.

The first apparatus for suspension and traction described by Hey-Groves was the Florschütz method, which had been used to some extent in Vienna (see Fig. 5). This apparatus consisted of a post attached to the head and another to the foot of the bed with a bar extending between them. The leg was then suspended from the overhead bar by means of wide bands of canvas or heavy sheeting above and below the knee. Traction was produced similar to the method used in Buck's extension. There were no splints used with this apparatus.

Blake's first use of this method in the present war was in the treatment of badly infected fractures of the shaft of the humerus and those involving the elbow joint. The structure from which suspension was made was what is now known as the Balkan frame. I have been unable to find anything in the literature upon the origin of the Balkan frame. It was used in the Balkan war, but whether it owes its origin to this war, I do not know.

In a personal communication from Major Blake which reached me a few days ago, he states that he obtained the idea of the frame which has been given the name of the Balkan frame from a frame used by Dr. H. M. M. Lyle of New York, when he was in charge of the branch of the American Ambulance Hospital at Juilly in 1914.

Quoting further from his letter he says: "As I understand it, this is not the Balkan frame, which I believe is simply two heavy posts connected by a horizontal bar a little longer than the bed. The posts are set on wide supports so that they can be shifted at any point at the head or foot of the bed. I understand that this apparatus derived its name from its being used in the Balkan war. I also understand and am positive it was used long before then."

I have found no mention in the literature by Lyle of the first use of this frame. It is very evident from Major Blake's description that what the English writers have called the Florschütz frame is the original Balkan frame.

Splints and apparatus devised by English surgeons in the present war are in most instances primarily for transportation, but adaptable for base hospital treatment. For the leg, many of these splints are in the form of an adjustable wire splint which can be rigidly attached to a stretcher or which rests upon the bed in the hospital. For wounds of the arm, various modifications of crutch splints are used. In cases where these splints are inapplicable, the Balkan frame or Florschütz frame is used.

Since this paper deals with the treatment of fractures in base hospital work, the description of apparatus and methods will be limited to those used in the treatment of fractures by suspension and traction from overhead frames, of which the Balkan frame has proven to be the most efficient and is the most widely used.

The Balkan frame is composed of four or five separate pieces; a head piece and foot piece, and two or three overhead bars to extend between the head and foot piece. All the parts are made of narrow boards about three inches wide by an inch thick. The head and foot pieces are made of two legs or uprights about six feet long and set at the bottom, a few inches wider apart than the width of the bed and at the top a few inches nearer together. They are joined at about the level of the mattress by a transverse bar, which in some cases is longer than the width of the bed to be used in abducting the leg or arm. Another transverse bar joins the top of the uprights, which is somewhat longer than the distance between the top of the uprights. This bar bears notches in the top one inch wide by about one inch deep and four inches apart to receive the longitudinal bars. The longitudinal bars are notched to correspond with the notches in the transverse bars. The head and foot pieces are roped or strapped to the head and foot of the bed and the longitudinal bars fitted into the notches in the transverse bars to make the frame rigid.

The splint first used by Blake for a fracture of the femur was a modified Thomas knee splint with a half circle crutch connecting the lateral rods posteriorly at the upper ends. (See Fig. 6.)

The crutch of this splint fitted snugly against the ischium. At the foot an adjustable wooden bar was slipped on the lateral rods so that it could be applied to any length leg. Traction was maintained by bands glued to sides of the leg and drawn tightly over the bar at the foot of the splint. The pressure from the crutch was very irritating, often causing blisters and pressure sores, so that it was necessary to discard the splint and substitute for it a Hodgen splint. Since then the Blake splint has been modified by Lieut. Col. Keller; the crutch is attached to the upper ends of the splint by hinges to equalize the pressure of the crutch. The traction bands are attached to the foot of the splint, but the pressure from the crutch is lessened by a cord and weight attached to the foot of the splint.

Other types of leg splints in use with suspension are the railway splint (Fig. 7) and the jointed Hodgen splint (Figs. 8 and 9). In applying the railway splint the thigh rests upon the upper part of the splint, then the leg below the knee is attached to the movable part, allowing the patient to flex the knee a few degrees. The jointed Hodgen splint, which was recently reported by the writer, was designed for complete mobilization of the knee during treatment. Traction is applied above the knee joint and the suspension arranged so that the patient flexes his knee voluntarily. The splint devised by Buckner is valuable in that it permits flexion of the knee during treatment of fractures of the femur. (Figs. 10 and 11.)

The type of splint and the application of it in the treatment of fractures of the femur and fractures of any bones varies with the individual case. In civil practice, fractures at certain levels result in fairly definite types of displacement of fragments. In war wounds, owing to the frequent injury to muscles and nerves in the region of the fracture, there is great varia-

FIG. 6.—Blake splint. Modification of Thomas' knee splint.

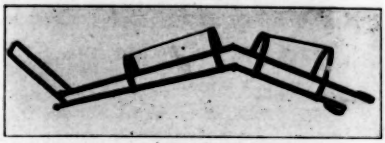

FIG. 8.—Jointed Hodgen splint.

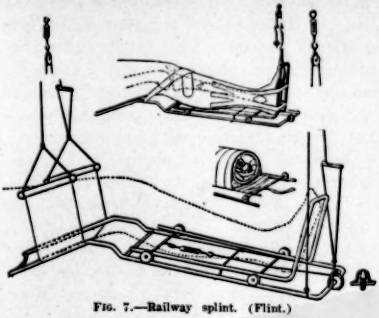

FIG. 7.—Railway splint. (Flint.)

FIG. 9.—Jointed Hodgen splint applied in fracture of upper third of femur. Note abduction support for the leg.

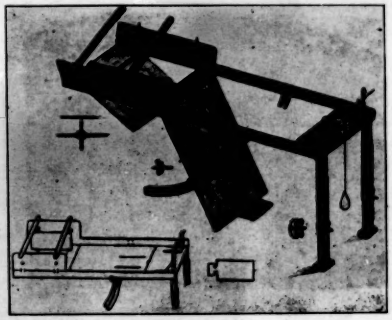

FIG. 10.—Buckner splint for fracture of the femur.

FIG. 11.—Buckner splint applied, showing flexion and extension of knee during treatment.

tion in the position of the fragments. In reducing the fracture and in the after-care, a position should be maintained which will give a good functioning limb. This position may not be the ideal, owing to the wound complicating the fracture, but it should be rarely necessary to allow a bone to unite in malposition, to be corrected after the wound is healed, or to immobilize joints of a limb to attain satisfactory position of the fragments.

In the treatment of fractures of the femur at any level, the original position advised by Smith and, later, by Hodgen, of flexion of the hip and knee, should be maintained whenever possible. This position not only relaxes the hamstrings and gastrocnemii, which interfere

with the correction of overriding of the fragments, but it also relaxes the psoas and iliacus and external rotators of the thigh, and aids in attaining proper alignment and rotation of fragments. It will also aid greatly in traction of the limb if the suspension cords are placed at the proper angle.

A brief description of the method of suspending the leg applies in general to a fracture at any level. Variations must be made in each individual case according to the wounds and displacement of fragments. The leg is suspended in the splint by means of bands of heavy cloth from six to ten inches wide and long enough to be passed back of the leg and pinned at each end to the lateral rods, There are usually two for the thigh and two for the leg below the knee. After the splint and the leg have been suspended from the Balkan frame, the proper adjustment of these bands not only adds much to the patient's comfort, but is a great factor in securing proper alignment and rotation of the fragments. Shortening a band upon one side of the leg near the site of fracture will often entirely change the alignment of the fragments before union has taken place. The position of the bones after reduction should be verified by bedside x-rays if possible, as only in this way can the best results be attained.

The suspension of the limb and splint is simple: A short cord is attached at each end to a lateral bar of the splint at the top and foot, and if the splint is bent or jointed at the knee a third cord should be attached at the knee. To the loops of these cords are attached single cords, which pass through pulleys in the longitudinal bars of the frame and are then attached to sandbags, which are of sufficient weight to just counter-balance the weight of the leg. If the leg, as frequently occurs, has a tendency to outward rotation, the single cords should be attached to the loops so that the outer parts of the loops are shorter than the inner. Then the single cords should be fastened with adhesive so they will not slip. The upward pull on these cords will rotate the leg inward. The reverse holds true if there is a tendency towards inward rotation of the limb.

In suspending the leg for fractures of the femur the original rules emphasized by Hodgen, and, later, amplified by Mudd, should be adhered to wherever possible. The pulleys in the longitudinal bars should be so placed that the suspending cords attached to the upper part of the splint will pull at an oblique angle toward the foot. (See Fig. 2.) By this means traction is exerted upon the thigh, so that less traction is required on the lateral bands. Mudd computed by trigonometry that if the pull exerted were at an angle of 15 degrees, a weight of 11½ pounds would exert a pull on the femur of 6.1 pounds. The foot of the bed should be raised from 6 to 10 inches to prevent the patient's slipping down toward the foot.

In regard to traction, there are four methods in use:

1. Adhesive bands or bands of flannelette glued to the skin.
2. Hennequin's band.
3. Some form of laced gaiter.
4. Direct traction by means of the Steinman pin or some modification of it or the Finochetto band.

Bands of adhesive tape are commonly used in English hospitals, but rarely in French hospitals; instead the bands are made of heavy flannelette or Canton flannel, 3 or 4 inches wide with a strap or strong tape sewed to one end, the length varying according to the length of the limb. These bands are attached to the skin by means of Heussner's glue or a similar mixture. Heussner's glue is composed of colophane 50 parts, 90% alcohol 50 parts, Venetian turpentine 1 part, and benzine 10 parts. This is quite irritating to the skin and frequently causes blisters. Blake has been using in place of it Sinclair-Smith's glue composed of common glue 50, water 50, glycerine 2, thymol 1, and calcium chloride 1, which is less irritating. Tuffier uses a glue composed of Canada balsam 2, Venetian turpentine 1 and ether 1. All of these mixtures are applied by painting them on the skin while warm, then laying the cloth band on the skin and painting the glue on the band. The band is then pressed into the glue with a firm bandage, until it dries, after which the bandage is removed, usually 3 to 6 hours, and traction begun.

In Dr. Tuffier's hospital at St. Germain they were using instead of Canton flannel bands, a method devised by Sinclair-Smith. A heavy stocking or stockinette was cut the length of the lower leg. It was then heavily padded at the lower end to prevent pressure on the malleoli, and straps of tape were sewed to the sides for traction. The leg was shaved, washed and

dried, the stocking pulled on and painted with glue. This was a very efficient method of traction, but did not allow for any swelling of the leg.

Hennequin's bands are used in fractures of the lower third of the femur or humerus or in fractures at higher levels, where the wound does not permit the application of long glued bands. The limb should be first heavily padded, then a strip of webbing 3 or 4 inches wide by 3 or 4 feet long is laid across the anterior surface of the limb at its center, the ends are carried back and crossed behind the limb, then brought up to the sides and folded so that the straps will exert traction in the same plane as the shaft of the bone. They are then pinned at the fold on each side of the limb. This is efficient as a method of traction, but unless the limb is firmly bandaged is apt to cause edema. The straps must be folded and pinned so that the pull upon them will be exerted in the line of the shaft of the bone, otherwise the bones will be bowed forward or backward.

The Steinman pin and its modifications are the ideal methods of traction as the pull is exerted directly upon the bone and not transmitted by muscles or fascia as in other methods of traction. Its field of usefulness in war wounds is rather limited owing to the frequency of infected wounds in close proximity to the point of application of the pin.

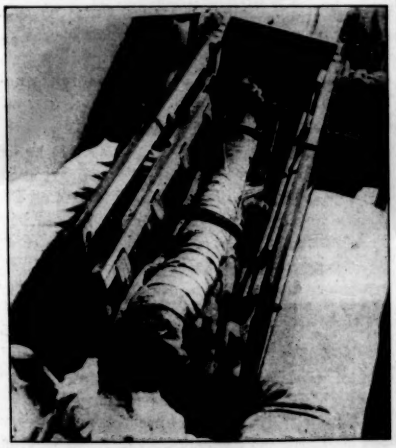

Fig. 12.—Cradle splint—supporting a flexed Hodgen splint.

The laced gaiter is an effective method of extension in fractures of the lower third of the leg. The foot should be firmly bandaged to prevent swelling. A modification of the gaiter has been applied successfully to the flexed knee for traction on the femur and to the elbow for extension of the humerus, where little traction is required.

Another form of traction should be mentioned, as it is used in fractures of the shaft of the femur, in which there is extensive injury to the soft parts. This consists in traction on the calf of the leg with the knee flexed to nearly a right angle by means of the bent Hodgen splint or by the cradle splint. (Fig. 12.) This is applicable in cases requiring moderate traction, as strong traction in this position is very uncomfortable.

Toe drop is prevented by the application of a spring splint of the Harley type or by applying a wide band about the ball of the foot with elastic bands attached to it, and to the lateral bars of the leg of the splint. A better method, and one more frequently used, is by gluing a wide band to the sole of the foot, attaching a cord to it and suspending the foot from the overhead bar by a light sandbag. (Fig. 13.) All of these methods are based upon the principle of allowing free motion of the ankle joint.

The treatment of fractures by suspension and traction offers certain advantages not embodied in other methods of treatment, which make it the ideal method of caring for badly infected compound fractures in base hospitals. There is no pressure on the limbs from splints or tight bandages, and the limb is maintained in an elevated position, allowing free circula-

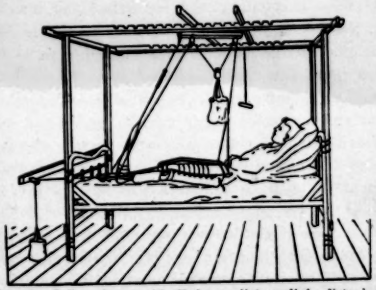

Fig. 13.—Balkan frame with Hodgen splint applied. Note band glued to sole of foot.

tion. As a result edema rapidly disappears and drainage is facilitated. The patient is absolutely comfortable, as the bones remain in the same relative position at all times. Dressings can be done and the patient move about and sit up in bed without disturbing the fragments. Neighboring joints can be moved and massaged without interfering with the wound. Consolidation of the bones and healing of the wound probably occur more rapidly than by other methods of treatment.

SPECIAL FRACTURES.

Certain general rules are to be followed in the treatment of fractures at different levels of bone, although these must be varied according to the peculiarities of the wounds in a given case. (Fig. 14.)

Femur, upper third: The position of the upper fragment in most cases is similar to that seen in civil practice,—abducted, flexed and rotated outward. Little can be done to change this position. The lower fragment must be brought into alignment with the upper. This is best done by flexion of the knee, or if this is impossible, raising the leg. The leg is then suspended in wide abduction by using long transverse bars and rotated outward by the methods already mentioned. Outward rotation can also be produced by gluing the toe-drop band to the sole of the foot in an oblique direction from the outer side of the sole to the base of the great toe so that the pull of suspension turns the foot outward. Traction should be made when possible above the knee joint, and the jointed Hodgen splint applied to prevent ankylosis of the knee. When this method is impracticable, the straight or slightly bent splint should be used, the leg raised and traction exerted on the leg below the knee.

Femur, middle third: Owing to the wound of the soft parts it is often difficult to apply traction above the knee, and the slightly bent splint must be used. There is less abduction, outward rotation and flexion of the upper fragments, owing to the attachment of muscles. The position in which the lower fragment is placed is simply a modification of that used in fractures of the upper third. Less abduction of the lower fragments is required to place it in alignment with the upper fragment as well as less outward rotation and flexion. (See Fig. 15.)

Femur, lower third: This type of fracture in war wounds, as in civil practice, is difficult to treat, owing to the backward displacement of the distal fragments, due to the pull of the gastrocnemii muscles. It offers the added difficulties in war wounds that the wounds of soft parts prevent in many cases any form of traction above the knee, and there is frequently injury to the knee joint itself. In the cases where the Hennequin band or Steinman pin can be used, reduction in proper alignment and rotation can usually be effected. Where these methods cannot be used every attempt should be made to obtain reduction and prevent union in malposition. The method which Blake has advocated of union in malposition with a straight splint and reduction while the callus is soft, by using the ankylosed knee for leverage, should be used as a last resort. Jones has frequently advised the use of traction with the Thomas knee splint in these cases, and cites a case where the distal fragment was compounded posteriorly and was seen to slip back in good position under this method of treatment. The Hodgen splint, flexed at nearly right angles with traction on the calf, has given good results in this type of fracture.

Fractures of the lower leg: Fractures of the fibula alone require little care except treatment of the wound of the soft part. Suspension is used during the acute stage of infection to add to the patient's comfort, to facilitate dressings, and to give better circulation.

Fractures of the tibia without injury to the fibula should be treated by suspension and traction, for the reasons stated above and to prevent a varus position of the foot. This is to be corrected by an unequal pull on the inner strap, using a gaiter for traction.

In cases of fracture of both bones of the leg, greater care must be exercised in applying apparatus. The traction pull must be exerted in the axis of the shaft of the tibia to avoid bowing forward or backward, and the supporting hammocks must be short enough to prevent posterior displacement of the bones. The method of traction to be used depends entirely upon the level of the fracture and the extent of the wound. Preferably lateral glued bands are to be used. In any method of traction applied above the malleoli, padding should be used sufficiently thick to prevent pressure on the malleoli. In all methods of traction except the Steinman pin, Finochetto band, etc., the

Fig. 14.—Bent Hodgen splint applied. Suspension in abduction.

Fig. 15.—Hodgen splint applied, with patient in prone position for fracture of middle third of femur.

extension straps are buckled to a wooden spreader in the middle of which is attached a cord and weight similar to that used in Buck's extension. The spreader should be wide enough to prevent pressure on the lateral surfaces of the limb below the point of application of the bands.

Little need be said regarding the treatment of fractures of the tarsals and metatarsals, except that better results are obtained by suspension. Traction is of little value. Toe drop should be prevented either by the use of the Cabot splint or one of the methods for its prevention already mentioned.

In the treatment of fractures of the humerus, two methods are in general use in French hospitals. The choice of methods depends upon the degree of infection and the general condition of the patient. Patients with a low grade of infection and good general condition are put up in the aeroplane splint of Leyva. (Figs. 16 and 17.) This splint per-

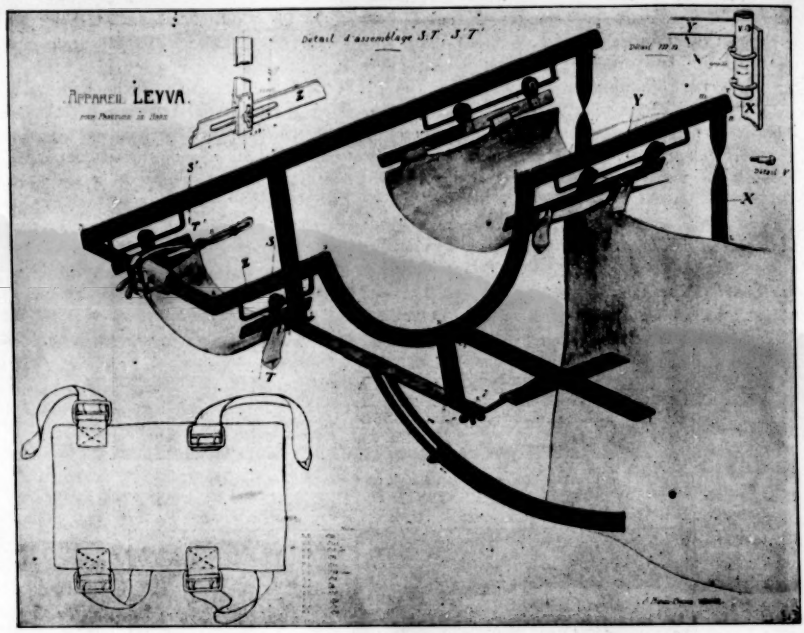


FIG. 16.—Aeroplane splint (Leyva).

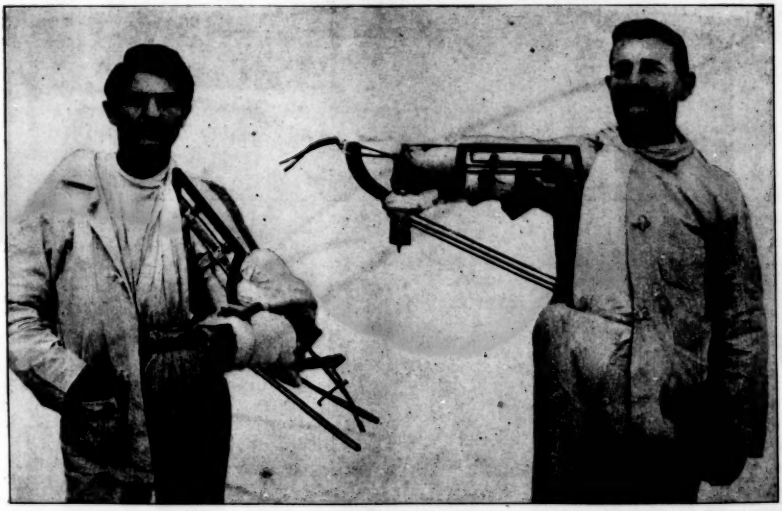

FIG. 17.—Aeroplane splint applied for fracture of humerus.

mits the application of suspension-traction methods of treatment and at the same time allows the patient to walk about. It is especially applicable to fractures of the humerus after the acute stage of infection is past.

In the early acute stage of infection of fractures of the humerus, suspension and traction with the Balkan frame is the method of choice. No splint is used. The upper arm is suspended directly by means of a wide band of heavy cloth or preferably double rubber sheeting. The width of the band corresponds to the length of the upper arm and is about two feet long. In the ends of these bands, rods of wood or iron are inserted and holes punched in the rubber back of the rods for suspension. The arm is then suspended by loops of cord tied into these holes, these being attached to a single cord and suspended from the longitudinal bar of the frame. (Fig. 18.)

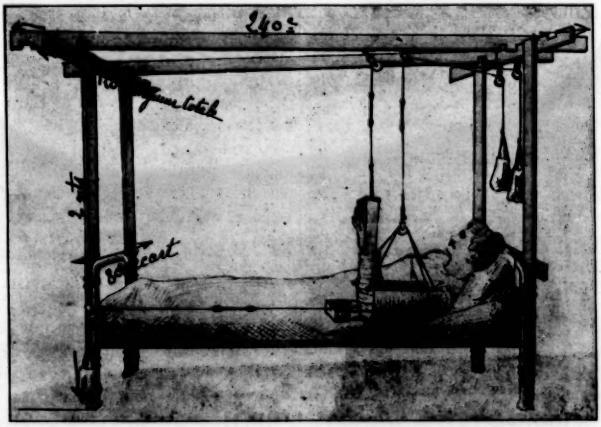

Fig. 18.—Apparatus applied for suspension treatment of fracture of humerus.

The forearm should be suspended vertically in these cases, if possible, to prevent edema, the bend at the elbow being nearly at a right angle, to allow traction from the upper arm. Suspension of the forearm is accomplished by bands glued to the flexor and extensor surface of the arm. These are attached to a wide wooden spreader beyond the reach of the fingers. To the ends of this spreader are attached elastic bands; these are attached to a round handle which is within reach of the fingers when the apparatus is suspended. This device was designed to exercise the fingers and wrist. In the middle of the spreader a cord is attached for suspension from the frame overhead.

The method of traction of the humerus depends upon the extent of the wound. In fractures at high levels with wounds corresponding, traction is applied with glued bands. In wounds near the elbow, traction is maintained by the Hennequin band or modified laced gaiter. Care should be taken to exert a pull in the axis of the shaft of the bone to avoid bowing.

The Steinman pin inserted through the condyles of the humerus, as advocated by Hey-Groves, has been rarely used owing to the danger of nerve injury. Suspension of the arm by means of the Balkan frame allows the patient to sit up or lie down in bed and permits considerable lateral motion.

There is one other method of suspension of the arm which deserves mention, though it is not used extensively in French hospitals. It is known as the Sinclair-Smith triangle frame. Dr. Tuffier was using it in his hospital at St. Germain. It consists of a small upright of wood about 2 by 4 inches, attached to one of the legs at the head of the bed. This stands about 5 feet high. At the top of the post is a triangle of wood on a swivel, with the apex of the triangle attached to the top of the post. In the arms of the triangle are pulleys for sus-

pension. The arm is suspended in a flexed wire splint arranged for traction, and the splint is suspended from the pulleys in the triangle With this apparatus properly applied, the patient can get out of bed and sit in a chair with perfect comfort.

In the treatment of injuries of the upper third of the humerus, in which there is loss of substance of the bone, such as excisions of the head of the humerus and comminutions of the shaft, no traction should be used. The arm is suspended in wide abduction and the forearm suspended as described.

In fractures of the upper third the upper fragment is abducted and rotated outward. The lower fragments must be suspended to bring it in to alignment. It is therefore abducted to meet the upper fragment and rotated outward by suspending it to a longitudinal bar outside the bar from which the arm is suspended. Traction in abduction is obtained by attachment of a pulley to a long crossbar at the foot of the bed or by means of a board slipped under the mattress, on the end of which a post is set with a pulley for the traction cord. This board can be adjusted to give the proper abduction.

In fractures of the middle third, slight changes in the apparatus are needed. Less abduction is required, and care must be exercised in applying the suspension band and traction to prevent bowing of the bones.

Fractures of the lower third are more difficult to treat owing to proximity of the wound to the elbow. Traction in the form of a Hennequin band or laced gaiter can usually be applied. The suspension band should support the elbow to prevent bowing. As soon as infection is controlled the Jones elbow splint is very serviceable in these cases.

Fractures at higher levels after infection has subsided and fibrous union has occurred can be placed in a gutter cast fitted into the axilla. This is very comfortable, but not especially easy to apply.

Forearm fractures are put up in two positions, according to the amount of traction needed and the edema in the arm. If there is much edema and moderate traction only is required, the flexed position similar to that used for fractures of the humerus is used, and a counterweight of about 3 pounds suspended from the upper arm applied. If greater traction is required the arm is slightly flexed. a Hennequin band applied at the elbow for counter traction, and traction applied to the forearm. In this position the forearm is suspended in a short splint similar to half a Hodgen splint or a small splint similar to the Thomas knee splint. The forearm is suspended in the splint in the usual way by bands of heavy cloth passing under the arm and pinned to the lateral rods of the splint.

The method of traction depends upon the site of the wound. In wounds of the upper part of the forearm traction is maintained by glued bands applied to the arm. If the wound is near the wrist, traction is applied by bands attached to the back and palm of the hand or by the method of Hey-Groves. This consists of a light band of iron which fits around the hand with a wire loop attached extending beyond the fingers. The band about the hand is attached to the skin by cloth bands and traction is applied to the wire loop. In all fractures of the forearm, whether one of the bones or both are broken, a position half way between pronation and supination should be maintained, as in this position the bones are more nearly parallel. These fractures usually require suspension treatment only during the stage of acute infection. After this stage is passed they can be transferred to the Jones splint for forearm fractures or any type of splint that permits walking about.

In the treatment of fractures involving the elbow joint the splint used by Flint is very comfortable. This is similar to the Nathan R. Smith leg splint and allows space beneath the splint for dressings. (Fig. 19.)

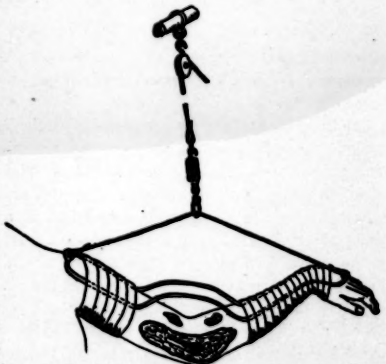

FIG. 19.—Anterior wire splint for suspension of fractures of elbow joint (Flint).

## CONCLUSIONS.

The idea of treating fractures by suspension and traction is not a product of the present war, as it was first used over a hundred years ago. The adaptation of this method to fractures of the arm and many improvements upon the original method of Hodgen for treating fractures of the leg are the results of the present war. Many of the new ideas in this method have been developed by surgeons of the staff of the American Ambulance Hospital, especially by Major Joseph Blake.

The introduction of this method in the present war was for the treatment of badly infected compound fractures. It has proved of inestimable value, from both a subjective and an objective point of view. Subjectively, there is absolute comfort to the patient at all times, as the fragments of bone remain in the same relative position when the patient moves about in bed and when the dressing is done. The pain from congestion of the limb is eliminated owing to the improved circulation.

Objectively, the edema of the limb disappears as the limb is higher than the body, and there are no tight bandages about the limb; the wound heals more quickly, due to better circulation. Union of fractures occurs early as a result of immobilizing the fragments, and ankylosis of neighboring joints is avoided by massage and motion during treatment.

It requires some training and patience to apply the apparatus properly at the first dressing. It also requires watchfulness on the part of the surgeon to maintain a proper application of the apparatus throughout treatment; but the results more than compensate for the added work.

The newer method of treating fractures in war wounds by removal of foreign bodies, with excision of infected and devitalized tissue in the path of the projectile and primary suture eliminates a large number of infected cases, formerly treated by this method. There is still a large field of usefulness for this method in wounds that are not treated by primary suture owing to the infecting bacteria, or for any other reason. Also in many fractures, after primary suture has been practised, it will be of value on account of the comfort to the patient and immobilization of the fragments.

## CIVIL PRACTICE.

In regard to the application of this method to fractures occurring in civil practice there is little at present to say. It has been used to some extent by surgeons who have had experience with it in war work, but no reports have as yet been published. A comparison of the results obtained by the suspension-traction method with those obtained in civil practice with the older methods of treatment in infected compound fractures will influence many to adopt it. The wide experience which our surgeons, who are now doing base hospital work abroad, are having with this method, will result in its more general adoption when they return to civil practice.

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## THE USE OF THE TURN-BUCKLE FOR TRACTION AND COUNTER-TRACTION IN THE TREATMENT OF FRACTURES.

BY FRANK HOLYOKE, M.D., HOLYOKE, MASS.

IT is a trite saying, indeed, that necessity is the mother of invention, but nowhere is this more true than in the life of a physician or surgeon where very often use must be made of the things at hand. And this very necessity may lead him to give birth to a new idea which, if it is carried out in the face of old and tried methods and proves a success, is at least worth the consideration of his fellows.

As all mechanical principles are found illustrated in the human body, so, also, is it true that some of the simplest things in mechanics prove of use to the surgeon in dealing with the body. In a practice of thirty-five years in a manufacturing city I have treated many fractures, but nowhere in surgical literature have I seen any reference to the use of the turn-buckle as a *direct* means of producing both traction and counter-traction in the treatment of fractures of the long bones. The turn-buckle has been used in other ways, chiefly in conjunction with the Steinman nail, which has its dangers. In my device the turn-buckles directly span the point of fracture.

The turn-buckle is a peculiarly unique mechanism where *carefully controlled traction* and counter-traction has proven necessary under x-ray findings, and I believe that it will find a very important place in surgery.

It may be found at any hardware store and is familiar to most of us as a means of making taut a slack wire or cable, or tightening up the buck-saw.

It has, however, also the reverse action,—that is, of pushing asunder, in a straight line, two given points. It is made up of three parts—the central frame with right and left female thread into either end of which fits an eye-screw.

There are, for ordinary use, four sizes, ranging from two and one-half to six inches, the four- or six-inch size being preferable in the average fracture case. Those made of galvanized iron are better for our purpose as they do not rust, and they withstand greater resistance than those made of brass, which are too soft.

To illustrate the use of the turn-buckle, take, for example, the following case:

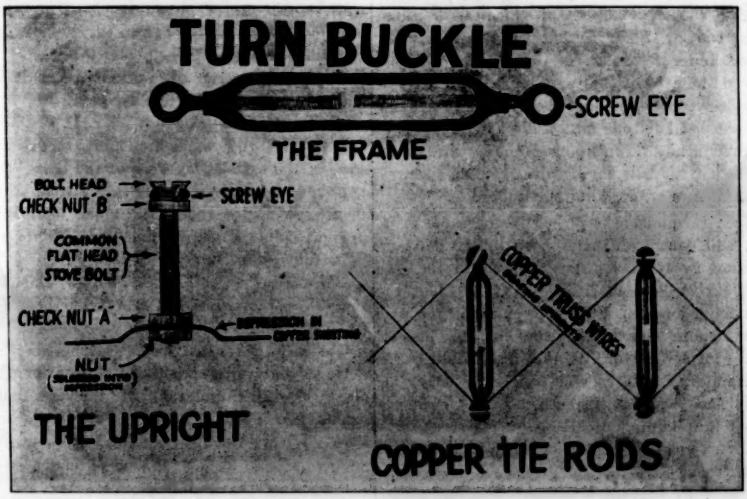
A five-year-old boy, knocked down by an automobile, sustained an oblique, compound fracture in the upper third of the right femur. He is a very active child, and it seemed to me that it would be a mercy to both patient and nurse so to apply extension and counter-extension that he would not be so closely confined to his hospital bed as he would be under the usual methods.

Extensive blood clots having been expressed from the wound and moist antiseptic dressings applied, with rest and elevation on pillows to reduce swelling during the first three days, the x-ray shows that the upper fragment points forward and outward, and we now adjust the fragments in line by flexing both thigh and knee with slight rotation outward, and in this position, with ether anesthesia, under some extension, a plaster spica is applied, encasing the pelvis and leg from the navel to the ankle.

When the plaster cast has hardened, another x-ray shows overlapping and some displacement of fractured ends with one inch shortening. The cast is now cut through transversely in two parts at the site of the fracture, the underlying bandage and dressings being undisturbed. A window is also cut in the plaster directly over the dressing of the external wound, which in this case is on the inner side

View of Outer Side of Leg with Apparatus in Place.

View of Inner Side of Leg with Apparatus in Place. Note that both Inner and Outer Turn Buckles are Placed at an Angle to Produce Outward Rotation of Lower Fragment.




of the thigh. With two strips of paper laid around the cast just above and below this transverse cut we now mark out patterns the exact size for two metallic collars, three or four inches wide, which are to be placed in corresponding positions, each to rest one-half inch from the slit in the cast and completely encircling the cast. From these paper patterns the metal collars are now made, corrugated copper sheeting being used for the purpose, as it is sufficiently strong and easy to adjust. The collars are cut in such a way that the corrugations in our copper sheeting run parallel with the limb to increase strength. While the paper patterns are fixed in their required position we decide the points at which to place the turn-buckles in order to get the proper extension and we mark the points for the opposing upright stove bolts to which are to be fixed the eyes of the turn-buckle.

The patterns being thus outlined for the proper setting of three turn-buckles, we now cut out the metal collars according to the patterns, and at each point indicated for the upright bolts a depression or dent is made in the collar deep enough to retain a nut on its concave or under side, having first punched a hole in the center of the depression large enough to admit the stove bolt. These nuts are then soldered immovably into the concave or inner side of the depression, so that the collar will lie smoothly upon the cast. The collars of themselves are now complete and are adjusted in proper position, being held for the instant in place by adhesive plaster until secured firmly to (incorporated with) the underlying

cast by a few turns of fresh plaster-of-Paris bandage. Put in applying this plaster-of-Paris bandage the screw holes in the copper collars are first packed with sheet wadding to prevent their filling with plaster of Paris while it is being applied. In place of sheet wadding for this purpose, I would hereafter use a well-oiled stove bolt as preferable, as was kindly suggested to me by Dr. H. F. Day of Boston.

We are now ready to place the turn-buckle and to support it in position, to which end we use "flathead stove bolts" with full-length thread, each bolt being provided with three nuts, one of these having been already soldered under the collar as described. We now thread the eyes of the turn-buckle onto the upright stove bolts, holding the eye firmly against the bolt-head by one nut, while a second nut is screwed firmly down upon the outer surface of the collar, the bolt having already been screwed into the nut underlying the collar.

Each turn-buckle is placed in the same manner, and when all have been firmly fixed in position by the bolts thus secured in the collars, our mechanism is complete. We now rotate the frame so that the ends of the eye screws push apart, the slit in the plaster cast widens and inevitably, in so doing, the overlapping fractured ends ride into place, the x-ray showing that displacement has been reduced to a minimum. However, to secure *absolute immobility*, copper wire is wound criss-cross from bolt to bolt, as guy wires or tie-rods are used to prevent a bridge from swinging. Of course, the necessary outward rotation of the distal fragment, also contracted by this apparatus, is brought about by placing the inner and outer turn-buckles at proper angles, which must be studied out in each individual case.

The cast and turn-buckles were removed at the end of the sixth week from the time of fracture, when, under the x-ray, we find that union is complete with a good, normal callus and no shortening or deformity. Movements of all joints were found to be free and the case was dismissed as cured.

This method may be used in fractures of any of the long bones of the body where continuous extension is required; even in fractures of the lower leg, thus avoiding not only operative interference, but also the necessity of a Finochetto stirrup or the Steinman nail.

One can see where it might appeal to the orthopedist as being of inestimable value in controlling some of the spinal deformities, dislocations or fractures.

*In conclusion*, there are certain points which I would emphasize:

1. Its simplicity. To one not familiar with the turn-buckle the above description may seem complicated, but it is really easy to make and simple to adjust.

2. Its use allows the safest handling of the patient and much freedom of action without disturbance of the parts. It also makes the work of the nurse much easier. The patient may be taken from the bed to the x-ray room at any time or moved from place to place.

3. The dressing of wounds is made easy and bed sores will be less frequent.

4. Remember:—

Keep the guy wires taut and secure them *close* to the cast, at the *base* of the bolts.

Keep the frame of the buckle turned so that it always makes slight resistance against the upright bolts to secure immobility. This is an important point.

The thread of all nuts, screws and bolts should be well greased to prevent them from rusting in.

Use only galvanized iron turn-buckles.

Have your upright bolts of proper length to allow easy manipulation of the turn-buckle (about two inches).

In screwing the upright stove bolts into the buried or soldered nut, stop when you meet the resistance of the underlying cast.

Copper wire (No. 15) is the best to use for tie rods, being easily handled. The crimped copper sheet plus the plaster-of-Paris cast does not interfere materially with getting a fairly good skiagraph.

To sum up:

The materials *needed* in addition to the plaster cast are only three or four turn-buckles, each four to six inches long, flathead stove bolts with full-length thread up to the bolt head, two for each turn-buckle. Three nuts for each of these stove bolts, one being soldered into the collar. For the collars I use what is known as "16 oz. crimped copper sheeting" (*i.e.*, 16 oz. to the square foot) and enough copper wire for tie rods.

Then last, but not least, you will need courage to try a new method, but when once tried I

believe you will be more than satisfied with the result.

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## Some Observations on War Surgery in France.

By W. Irving Clark, M.D., Worcester, Mass.

This paper is not a scientific contribution. It is an effort to put briefly before the members of this section the observations of the writer during six months in France.

Traumatic surgery as a whole has been unchanged by the war. The basic principles of asepsis in operating, irrigation in cases of infection, and extension in alignment of fragments in cases of fracture, are maintained and practised in every war hospital in France.

Many ideas have undergone modification, and there have been a multiplicity of methods for handling different types of injury, but the methods which are now becoming so generally used as to be almost standard are based on old and well-known surgical principles.

In order that you may see the general picture as I have seen it I will sketch the course of a wounded soldier from the trenches to the rear, indicating as he proceeds the most probable course of treatment he will receive, and endeavoring to sketch the new forms of treatment or modifications of old forms, as they present themselves.

In drawing this general picture it will be impossible to touch on the bizarre wounds, plastic surgery, or any special branch, and I shall confine myself to the more common types which are met in any war hospital service.

Wounds of war may be roughly divided into two great classes, the slight or flesh wounds (the *petits blesses* of the French) and the more severe wounds, fractures, wounds of one of the three body cavities and nerve injuries (the *grands blesses*).

From the point of view of the Army the former are the most important, for by prompt and effective treatment a man may be returned to the ranks in a month or six weeks, while in the latter his return at any time is problematical. According to most recent reports, 80% of the lightly wounded return to the ranks in four to five weeks. Moreover, the slight wounds, if not treated according to recently accepted methods, invariably become infected, endangering the limb and often the life of the soldier.

The primary treatment of all wounds on the battle field is practically the same. This treatment is given at the first dressing station and consists of a removal of any gross material projecting from the wound, painting the wound and skin with some form of iodine, usually the tincture, applying a sterile pad and bandage, and immobilizing the wounded part in case of fracture for transportation. For this immobilization some form of Thomas splint is usually preferred. The U. S. Army has adopted the Blake-Kellar modification, in which the hip ring is not complete, the anterior half being replaced by a strap and buckle. Traction is exerted by means of an anklet with lateral straps or by a clamp attached to the patient's shoe with traction straps depending from it. These straps are tied about the notch in the lower end of the splint and twisted taut with a pin, which by being partly withdrawn impinges on the side of the splint and prevents unwinding. All fractures of the leg in the American Army will probably be transported in these splints, while a smaller similar splint is used for the arm fractures.

The patient, having thus been prepared, is transported to the most active hospital in the war—the evacuation or front line hospital. These hospitals are supposed to be as close to the line as safe, safety being gauged entirely by shelling. When a hospital comes under regular shell fire it is evacuated to a point just out of reach of the usual shelling. The object of this close proximity to the line is to enable the surgeons to operate at the earliest possible moment after the wound has been received,—within six hours, if possible. All wounds at this hospital receive the same attention, but in most cases the more severely wounded are transported directly to base hospitals or hospitals further to the rear if their condition permits. Arrived at this first hospital after the regular cleaning, the patient is immediately given a general anesthetic, placed on the operating table, and the wound and surrounding skin washed with ether and painted with tincture of iodine. An elliptical incision is made around the wound. The outlined piece of skin with the wound in the center is raised and the dissection carried on along the tract of the piece of shell, the surgeon being guided by the appearance of the tissues, until the capote or piece of cloth and the fragment of shell are reached, the whole

tract including the foreign bodies, being removed like a tumor "en bloc." When this cannot be done, the wound tract is laid open and followed, all damaged and discolored tissue being dissected away.

All wounds more than ten hours old are left unsutured. Where bone is involved, the fragments unattached to periosteum are gently removed, all others being left in place. Compound fractures are not closed by primary suture.

After primary suture a patient is supposed to remain in the hospital for ten days under observation before being evacuated to a base.

If the foreign body cannot be located, the operation is transferred to the x-ray room, where the operator works with the aid of a fluoroscopic screen. The work done this way is very beautiful, neat and accurate.

Amputations are never done if they can be avoided. All amputations are guillotine type with no flaps, by order in the French Army.

Chest cases are usually treated expectantly, that is, beyond the excision and cleaning up of the wound of entry, no operative work is attempted.

Abdominal cases are treated very much as in civil surgery. The mortality in these cases is high.

Head cases are usually sent to a special hospital. I was unfortunate in not seeing any. I understand that the operating is conservative, pressure being removed and fragments of brain and foreign matter being irrigated or sucked out with a catheter, very gentle negative pressure being used.

In due time the patient, no matter what his type of wound, is transferred to a base hospital.

The base hospital is where the less spectacular but perhaps the most difficult, work is done. Among the French the wounded soldier remains at a base hospital until he is either entirely cured or until all operative treatment is completed.

The work consists principally of the treatment of: (*a*) infected wounds of the soft parts, (*b*) compound fractures, (*c*) amputations, (*d*) chest cases. Head, face and abdominal cases are usually treated at special hospitals.

The treatment of all infected wounds is divided into two classes:

(1) Those very slightly infected with a non-virulent organism.

(2) Those badly infected with many organisms or lightly infected with a virulent organism, especially streptococcus and b.a.c.

The treatment of Type 1 consists in either drawing the edges together with adhesive and treating as an aseptic wound or in placing a secondary suture. The determination is usually made quantitatively by the Carrel counting system and qualitatively by culture. Streptococci, even in small numbers, especially if in pure culture, are considered an absolute bar to secondary closure of any type. B.a.c. is not considered so unfavorably, and if not present in large numbers many surgeons unhesitatingly strap the wound. A large proportion of wounds seen at a base hospital are slightly infected with b.a.c.

In the majority of cases neither strapping nor secondary suture is done. The wound is left wide open and treated with Carrel tubes. Dakin solution is not used exclusively. In many cases a weak acetic acid solution, usually combined with quinine, is used, this being particularly valuable when the bacteria are those requiring an alkaline medium for growth, or where there is a tendency to secondary hemorrhage. In spite of the numerous solutions used, it is interesting to note that the Carrel method of administration is universally used, and that such leading surgeons in Paris as Chutro and Tuffier use Dakin's solution entirely, adhering exactly to the Carrel technic.

The management and dressing of these multiple infected wounds, usually complicated by fractures, tries all the ingenuity of the surgeons and nurses. That it is possible to do these dressings rapidly, effectively and without great pain is due largely to the suspension method of treatment, and partly to the number of assistants available in a war hospital. The means by which this is done will now be discussed, as it is the method most employed in caring for the most common of all the serious cases in base hospitals—compound fractures of the lower extremity. A compound fracture of the upper extremity is often treated in ambulatory apparatus, and the difficulty of dressing these cases is not great, but the compound fracture of the lower extremity, usually complicated by multiple wounds, is much more of a problem.

The basis of treatment is the Balkan frame, now modified and perfected into a very simple but invaluable structure.

The frame here described is that used at American Red Cross Military Hospital No. 2, and is standard for the U. S. Army.

The frame consists of a head frame and foot frame of wood united by longitudinal bars. The wood is white pine, 7/8 x 2 in. The head and foot frames consist of two uprights slightly slanted to form a truncated A. The cross bars which hold these uprights together are the width of the bed, at top extending beyond uprights on either side, while the lower joins the uprights at the level of the mattress.

The longitudinal bars are two in number, resting on the upper cross bars and retained in any desired position by reciprocal notches (mortise joint).

The two advantages presented by the frame are suspension and traction. Suspension is maintained by a Hodgen or Thomas splint, which supports the lower extremity as in a cradle, this being suspended by cords and counterweights, which are so arranged that they exactly balance the weight of the limb and splint. Toe drop is prevented by a special counter-weight, while traction is maintained by direct pull through extension bands glued to the skin, by a Steinman pin, or a Finochetto stirrup. The principle of suspension allows the patient free movement in bed, makes for ease of dressing, and permits of motion in hip, knee and ankle. This change in treatment is due to the development of the theory that if the fragments of a fracture are kept in proper alignment, immobilization of the joints above and below the point of fracture is unnecessary.

The two great principles of treating compound fractures are:

(1) Arranging the apparatus so that the lower fragment is in line with the upper fragment.

(2) Making very strong traction for the first 24 to 48 hours, until all muscular pull has been overcome and then reducing the weight.

The wounds are treated as described above. Fractures about the joint frequently require resection. The Lyon School has developed resection of joints of the upper extremity to a remarkable degree. Using the sharp periosteal elevator, they carefully denude each fragment which is to be removed, taking the periosteum and a very thin shaving of bone. All fragments having been removed, the joint is immobilized with plaster for a short period of time, usually 7-10 days, and then active motion is started. The operated area is also exposed to the sun for a period of 15 minutes each day. New bone regenerates fairly rapidly and is shaped by the muscular pull on the periosteum so that a fairly serviceable joint results. The period of reconstruction is usually four to 6 months. The sunlight treatment of all open wounds is being advocated and tried largely throughout France.

Empyema of the chronic form is treated by wide opening, irrigation and the placement of Carrel tubes, which extend all through the cavity. As many as twenty or thirty tubes are used. Tuffier thus completely disinfects the cavities of old empyemas and then sutures tight by a plastic operation. His results are remarkable. I did not see the results of other surgeons employing the same method, and do not know if it is in general use.

At the French hospitals which I visited, bone plating was used in preference to bone grafts, though grafts were used in some cases. When grafts were used they were cut by chisel rather than electric saw. The French surgeons believe that the trauma caused by the saw is greater than that caused by the chisel, and that latent infection is more likely to be stirred up. It is considered inadvisable to graft previously infected bone sooner than three months after the wound has healed. Plates are often tried somewhat earlier, especially if the infection was not severe.

Compound fractures are very frequently complicated by severance or injury to a large nerve. In these cases no operation of suturing is considered advisable until four months after the wound has healed, because of secondary lighting up of infection; the same rule holds for tendon transplants or suture.

In nerve cases, supporting splints are used, as the Jones "cock-up" splint in radial paralysis. This allows the patient to use the hand and keeps up muscular tone. Massage is preferred to electrical stimulation previous to nerve suture.

The French use plaster very beautifully. Instead of employing the plaster bandage, forms are cut out of crinoline, 12-22 thicknesses being used. These forms are immersed in plaster cream, which is well rubbed into the form. The form is then applied directly to the affected limb, the skin of which has been coated with vaseline. A very fine dental plaster is employed, and there appears to be no irritation.

The cream is made by adding the plaster little by little to a basin holding about a quart of cold water, the water being gently but continuously agitated with the hand as the plaster is added. When the consistency is such that the withdrawn hand appears to be covered with a white cotton glove, the correct combination has been made. The form is immediately plunged in the plaster bouillon as described above. Many ingenious forms are used, especially the Delbet *appareil de marche* for fractures of the leg. Upon the completion of all operative work and the healing of all wounds the patient is sent to a physiotherapeutic center. Here he receives massage, mechano-therapy, electricity, heat and gymnastic training. Following this, if unable to return to the Army, he enters a re-educational school where, with the assistance of many ingenious types of apparatus, he is taught to adapt himself to his physical incapacity, and after from three to six months enters once more into civil life.

DISCUSSION.

DR. DAVID CHEEVER, Boston: I was very much interested in what Dr. Clark had to say, especially about the guillotine amputations. That was the method used in the British army in 1915-1916, but I note that lately in the British surgical literature there have been many protests against this method. They necessitated secondary amputations, which resulted in marked additional shortening of the limb, and in a certain number of cases secondary tetanus appeared. Of course that could, no doubt, be handled by additional prophylactic injections of tetanus serum, so that the latent and encapsulated organisms freed by the secondary operation would be destroyed. It would seem that flap amputations, with the tissues held widely apart by appropriate packing with gauze and protective tissue, would be as effective in preventing gas bacillus infection and give better stumps.

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## DISCUSSION ON EMPYEMA AND ITS TREATMENT IN MILITARY CANTONMENTS DURING THE WINTER OF 1917-1918.

BY MAJOR HOMER GAGE, M.R.C., WORCESTER, MASS.

IN response to the invitation of your committee, I am very glad to say a few words about one of the camp problems that has bothered us all winter, and that is really one of the most interesting and one of the most important problems that has arisen during the winter's work among the new recruits.

Our problems are quite different from those encountered in the camps in 1898, a difference largely due to the elimination of typhoid fever and the so-called "typhoid malaria." The absence of these diseases is due chiefly to the triple inoculation with typhoid and paratyphoid vaccines; but the splendid work of the Medical Corps of the Army in improving camp sanitation, in the careful selection of camp sites, with reference to their natural soils and drainage, and eliminating the sources of malaria and other insect-borne diseases, has been an important contributing factor.

In spite of all possible care, the herding together in barrack life of large numbers of men, especially from the country districts, has favored the spread of certain other infections. To a lesser degree we have scarlet fever and diphtheria; to a greater degree mumps and cerebrospinal meningitis, although we have been very fortunate in having little of the latter in New England. And to a still greater degree we have had measles and pneumonia, which have taken the place to a considerable extent of typhoid and its allied diseases, as the most common and the most dangerous diseases incident to camp life. They are always present in our base hospitals in larger proportion than one sees in our civil hospitals; and at periods of great activity, as after the arrival of large numbers of new recruits, constitute a clinic the value of which cannot be appreciated by those not in the service. The clinic thus constituted is an exceedingly valuable post-graduate course for the general practitioner.

From a surgical point of view, the most interesting thing in connection with the epidemic of pneumonia and measles has been the study of the empyema with which they have been so frequently complicated. In our experience about twenty per cent. of all cases of pneumonia have been followed by empyema, fifteen per cent. of the straight lobar pneumonias, and twenty-one per cent. of the post-measles pneumonias. The empyema met with has been very different from the type which we have been accustomed to see in civil practice and in our local hospitals.

Ordinarily, if, after the crisis of the pneu-

monia, we have a subsequent rise in temperature, or when the temperature remains up after the crisis should have occurred, we begin to look out for the physical signs of empyema, and when this seems sufficiently evident we aspirate, and if we find thick, purulent fluid, the case is turned over to the surgeon. Except in older, neglected cases it is not often regarded as an emergency, but is operated on, as the fluid reaccumulates, often under general anesthesia, and usually with the resection of a rib. If the case is neglected or unsuspected, we get a picture of general sepsis with marked dyspnea from lung compression

Now the empyema of camp life during the past winter has been very different. It is of rapid development; does not wait for the crisis; in some instances fluid being present within three or four days after the symptoms of the pneumonia. More rarely it appears without the preceding pneumonia. In eighty-one cases of pneumonia with empyema, fluid was found, in sixty per cent. within the first two weeks, and in most of these within the first week. In other words, it has usually appeared before the pneumonia has cleared up, thus adding very greatly to the danger and difficulties of surgical treatment. Then again the fluid has collected very rapidly and suddenly, often reaching large amounts within twenty-four hours.

Another feature that has distinguished these cases from those ordinarily met with has been the character of the fluid. In very few cases have we found frank pus. We get instead a cloudy, serous fluid with much fibrin, showing many leucocytes microscopically. The fluid is often so clear that it seems hardly necessary to drain.

I do not know what is the mortality of empyema in civil life, although I believe it to be higher than has been generally realized. However, I do not think it has been comparable to the mortality from empyema as experienced during the last winter in the different camps. In one it was eighty-four per cent., in others fifty-three per cent., fifty-seven per cent., and sixty-five per cent. In twenty-five different camps there was an average mortality of over thirty per cent. It is clear, therefore, that pneumonia and empyema have been very important factors in the mortality as well as the morbidity statistics of the army camps.

Bacteriologically, most of these cases have shown hemolytic streptococcus, both in smear and culture; and this has been true even of the lobar pneumonia. Often a Type I or Type II pneumonia would be accompanied by a streptococcus empyema. In some, where the mortality has been very low, the streptococcus has been absent, but apparently it has been quite universal. We undertook one or two interesting experiments to see how prevalent it was among the officers. From the medical officers at the Base Hospital cultures from the throats showed that seventy-two per cent. carried the hemolytic streptococcus in their throats. Then we tried it among the nurses, and found that sixty per cent. of the nurses carried it. Then, as a check, we took the camp surgeons, including the regimental surgeons, and only five per cent. of them were streptococcus carriers. Yet, of course, the cases of pneumonia were all coming from the camp. There were no cases of the streptococcus pneumonia among the personnel of the hospital, in spite of the fact that seventy per cent. of us were carriers.

We believe that the empyema was simply a local manifestation of a blood infection, that is to say, it was but an expression of a general constitutional infection. We felt that only upon some such basis could we explain the presence of the infection in both pleurae at the same time, in the pericardium, and even in the peritoneum. To these we occasionally added joint infections so that we really had a polyserositis. Although the pericardium was often involved, the endocardium was seldom infected. I remember but one instance, a case that was apparently convalescent, but which terminated fatally. The patient was sitting up in bed about ten days after thoracotomy, talking with his father, apparently very well, when he was seized with a sudden dyspnea and cyanosis, and died within five minutes, as if from pulmonary embolus. Autopsy showed an organized clot on the side of the right auricle, partly detached, and blocking the auriculo-ventricular opening. A noticeable feature of the autopsy was the presence of multiple pulmonary abscesses, some of them very minute, some holding two or three cc. of pus. When these were at the periphery of the lung, it seemed possible that their rupture might have given rise to a direct contamination of the pleural cavity, perhaps even with the pneumothorax that was occasionally met with.

One other interesting point disclosed by

autopsy was the presence of a large collection of fluid, in a few of our cases, between the left lung and the pericardium. It was really a walled-off abscess lying between two layers of the pleura. In one instance we found three or four hundred cc. in this locality. If we could have located it ante mortem, it could have been drained, but we were unable to detect it, even with the assistance of the x-ray.

The clinical picture differs from ordinary empyema, chiefly in its early appearance as a complication of the pneumonic process. The patients are, therefore, as a rule, much sicker than we have been accustomed to see them. If they live long enough for resolution to take place, they present a picture not unlike that commonly seen in civil practice.

In establishing the diagnosis, aside from the ordinary physical signs, the x-ray is of great value, often indicating and locating the pneumonia even before the physical signs are clearly defined, and revealing the presence and progress of a pleural effusion. Chief reliance as to the presence of fluid must, however, be placed upon repeated tapping of the chest with a good-sized needle. Some of the patients have to be tapped many times. As soon as you suspect the fluid, tap, and then tap again, and keep it up until you are thoroughly satisfied. It apparently does not disturb the patients much, if carefully and properly done, and it leads to a much earlier diagnosis than you get in any other way.

As to the interesting problem of treatment, of course we have the alternatives of frequent repeated aspirations and of drainage, and drainage may be obtained with or without rib resection. Repeated aspiration in some camps has turned out pretty well. In a few of the camps too extensive operation seems to have raised the mortality. We aspirated frequently, but in presence of a streptococcus infection, as proved by smear and culture, or in the presence of frank pus, we operated, and we operated as early as either condition was established. As to the form of operation we felt, and still feel, that the patients were so very sick that it was unwise to add any greater discomfort or shock than was absolutely necessary, and in all instances we did a simple thoracotomy under local anesthesia. In the adult, one can get a large drainage tube between the ribs, and secure such good drainage that rib resection would not seem to be called for.

As for irrigation, we did not irrigate except in cases where there was a foul odor to the fluid (and that happened only once), and in cases where there were large fibrin clots, which we could not remove without irrigation.

We had twenty-one cases in which we had pneumococcus infection alone. Of these, seven were operated on without any deaths, and of the fourteen not operated, eleven died. There were forty-one cases with the streptococcus alone, twenty-six of which were operated on, with, up to the present time, eight deaths, and fifteen not operated on with eleven deaths. The infection was a mixed streptococcus and pneumococcus in five operative cases without a death, and in eight cases not operated on, of which four died. Of the cases in which the infection was unknown, or not recorded there were four, all operated on, and one of them died. Out of twenty-four operative cases, there has been up to the present time a mortality of eighteen per cent., and of thirty-seven non-operative cases there was a mortality of seventy per cent.

To summarize: I think our experience illustrates very well the absolute importance and necessity of operation. Its value seems to have been clearly brought out in our group of cases, and my experience and observation of the results in other camps leads me to stick strongly to my opinion about the value of simple thoracotomy with local anesthesia, as against the excision of rib, believing that the less you do to a patient so sick, in getting relief from the immediate difficulty, the better the chance you give him to get well. The only change that I should make in a future series of cases would be to put them immediately upon irrigation with Carrel-Dakin solution.

### DISCUSSION.

S. J. MIXTER, Maj. M.R.C.: These cases of pneumonia and empyema have been most interesting as well as most trying. I have had a chance to see them in the base hospitals, and also to go over the statistics and the figures as they come in from week to week in the office at Washington.

The first thing which strikes one is the apparent difference in the virulence of empyema in different localities. I do not think the difference in the mortality in different places is entirely due to differences in operations, although it has been found that the more exten-

sive operations tend to be fatal. Another thing that is true beyond a doubt is that no one but an idiot would think of using ether for the operations, and the best results in these cases are, of course, from the use of local anesthesia.

Another interesting point to me in considering the prevalence of pneumonia is the fact that the men coming in from the country places where it would be supposed we would find the healthiest boys, are the first to succumb. That was true in the Civil War as well as in this war. It is also curious to note that in one camp there might be a high rate of mortality, and in a neighboring camp under almost similar conditions there would be a comparatively low mortality.

Dr. Gage did not speak of one very interesting thing at Devens, and that is that the introduction of the colored troops from the South brought on a tremendous wave of pneumonia. The morbidity among the colored troops, as I followed it up, was forty times as great as among the whites during the month of April. Those were mostly pneumococcus infections. The Surgeon-General's Office has sent out several units to study this problem, and they are now at work on it. The virulence of the wave has apparently passed, and now we are getting a turn for the better.

I was interested in reading a couple of weeks ago, if I am not mistaken, that Camp Devens is the healthiest place of all the camps. Yet they had the greatest number of pneumonias, and they were probably due to these colored troops.

Dr. Wyman Whittemore, Boston: My experience with empyemas has been limited entirely to civil life. Dr. Gage has told us about these cases in camp life, and it may interest you to hear a little about this subject from the civilian side.

All surgeons who are interested in thoracic surgery have been especially interested this last winter and spring in the large number of streptococcus empyemas that have occurred. In February I made an unfortunate statement at a medical meeting, which was true at that time, that in my experience streptococcus empyemas were rather rare, and that when they did occur they were usually fatal. Since then I have had to change this opinion as I have seen quite a few cases and most of them have gotten well.

The old operation of excising a rib and draining the pleural cavity with one or two large rubber tubes is almost sure death. If one is lucky enough not to have the patient die, the convalescence is a very long affair, one extending over several months, and then the patient is left with a partly or completely collapsed lung and a large pneumothorax.

The technic that I have used is a very simple one. A large trocar is placed into the pleural cavity between the ribs, under local anesthesia, a tight-fitting catheter is slipped through this and sewed very tightly to the skin. The catheter is connected with a long rubber tube going into a bottle that has a little water in it and the end of the tube is under the surface of the water. The operation is done in such a way that no air gets into the pleural cavity during the operation or after. For the first three or four days the patient empties out his pleural cavity by himself, then an electrical suction apparatus is attached to the tube and run according to the rapidity of the accumulation of the streptococcus fluid in the pleural cavity. At about this same time Dakin's solution is put into the chest cavity through the tube and left in two hours; then it is removed and fresh Dakin's put in. Since the first of February I have had 13 cases of straight streptococcus empyema, mostly at the Massachusetts General Hospital and a few in private. Two have died and the rest have gotten well, giving me a mortality of about 15%.

The other method of treatment of these cases that we are particularly interested in at the Massachusetts General Hospital is the Carrel-Dakin treatment. Now I have probably no right to express an opinion about this treatment at present, as we have had the apparatus for about six weeks only and have not had enough cases yet. But during this time I have become somewhat prejudiced against it in the streptococcus cases but not in the pneumococcus cases. In doing the operation one takes out a part of a rib, and immediately establishes a large pneumothorax and a partly collapsed lung. If one could get the pleural cavity sterile with Dakin's solution in a week or ten days, and then close the wound and have the lung expand, I should say it was perfect treatment, but I cannot do this at present. It takes very much longer. There is also a danger of

reinfection. One case that I have had recently got the cavity sterile in about four weeks; the wound was closed. X-ray showed no fluid in the pleural cavity, but a persisting patch of pneumonia in the lower lobe. After running a septic temperature for three or four days, we opened up the cavity again and found considerable pus containing streptococci. In my experience a streptococcus pneumonia takes a good deal longer to clear up than a pneumococcus one, and I believe that this case got reinfected from the persisting streptococcus pneumonia.

I believe very strongly that the pneumococcus cases should be operated upon before the aspiration needle draws out a thick pus. When aspiration shows a turbid fluid containing pneumococci and a high polynuclear cell count, then is the time to operate. The catheter-suction apparatus gives excellent results. When there is thick pus and lymph, I think Lilienthal's operation the one of choice. This may seem a very radical operation to do, but when one becomes familiar with the technic and sees how well patients do, one's prejudice soon goes. I have done seventeen cases this way. All have healed up in from eighteen days to four weeks. One case died, which was very unfortunate, as it was a child that did very well for three days and then had a sudden convulsion and died with symptoms of cerebral embolus. One case healed up in three weeks, left the hospital apparently perfectly well and came back again in two or three weeks with more pus in the pleural cavity. One death in seventeen cases gives a mortality of 5%.

I have been much interested to watch the gradual drop of the mortality at the Massachusetts General Hospital. A few years ago there was a mortality of about 20% in acute empyemas. This is about the same as other large general hospitals. But all cases were operated upon in the same way, taking out a rib, sometimes at the bottom of the cavity and sometimes not. During the last year, from June 15, 1917, to June 15, 1918, there have been 37 cases of acute empyema, 10 of these streptococcus ones and the rest pneumococcus ones, and we have lost just 2, one a streptococcus case and the other a pneumococcus one. This brings our mortality down to 5%.

DR. CLEAVELAND FLOYD, Boston: My observations are entirely bacteriological, based on a series of cases of empyema on Dr. Ladd's service at the Children's Hospital. As the result of the use of serum in the treatment of pneumonia by Cole, it seemed worth while to attempt it in cases of pneumococcus empyema. A series of fifteen cases was studied. The type of organism we found to be Type 1 in all but two cases, and in these it was Type 2 and Type 4. The method followed was to irrigate with normal saline after the chest had been drained and then leave in the pleural cavity 10-15 cc. of serum. A study of the pus from time to time as the treatment continued showed a marked diminution of pneumococci, an increase in phagocytosis and precipitins unless the cases were doing badly.

In many instances the length of the convalescence was due to appearance of secondary infection.

If a potent streptococcus serum could be produced it might be worth while to use it in the empyema following measles.

DR. C. L. SCUDDER, Boston: In regard to the Carrel-Dakin treatment, the Rockefeller Institute has been employing this method in their cases of empyema for some time. Dr. Stewart, who has charge there, made a report at Chicago of the cases which they have treated by the Carrel-Dakin method.

The method has been introduced at the Massachusetts General Hospital for the treatment of wounds. I want to say one word of warning and make a suggestion in connection with the employment of this method. It seems to me that the Carrel-Dakin system of treatment depends for its success upon the accuracy with which the details are carried out, and it should not be employed anywhere, either in private work or in a hospital, unless all the conditions are fulfilled which Carrel insists upon. A word may not be amiss as to just what those conditions are. The details of the technic should be in every sense complied with. The solution itself should be standardized and made by a competent chemist. The size of the tubes should be approved by men with as wide experience as Carrel.

For our work at the Massachusetts General Hospital we sent down to the Rockefeller Institute a resident on one of the services, who spent three weeks at the War Hospital taking the course. We also sent a trained nurse, who studied the methods of preparation in the making of tubes, the sterilization, and all the details that go with the technic. We also sent

down a chemist, who spent 24 hours in the laboratory, learning how a standardized solution was made. We now have six people at the Hospital in carrying out this treatment.

We have used the treatment in a limited number of cases. I believe that its success depends primarily upon the care with which it is employed.

The Carrel-Dakin treatment, so-called, has come to stay as a definite procedure in the treatment of septic wounds. I believe that this treatment represents one of the important contributions of war surgery to the surgery of civil life. Its application to the treatment of empyema is apparently wise. It has been employed at the Massachusetts General Hospital in the treatment of other wounds than empyema. In connection with the empyemata the method of employment has been somewhat varied, but in general the plan has been to drain the empyema cavity at its most dependent part and to introduce at this dependent part a rubber drainage tube, and in addition to introduce two Carrel tubes into the upper or highest part of the cavity so that the Dakin solution may be sprayed into the cavity, bathe it completely and be drawn off through the lower tube. By employing this method it has been found possible to disinfect these secondarily infected empyema cavities, to diminish the time of drainage, and to close the opening earlier than under other conditions. I think that the fact that the Carrel-Dakin treatment is able to combat the secondary infection associated with most empyemata is the reason why we may expect that this method will be of permanent value in the treatment of the empyemata, for it is the secondary infections that are the most serious.

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## Splints For Transportation.

By Major Kendall Emerson, M.R.C., Worcester.

The war has placed a new onus on the always difficult problem of fixation in cases of fracture and joint injury. Early mortality in cases of compound fracture of the thigh was traced to the lack of proper fixation of the limb during transportation of the injured man from the trench or No Man's Land to the first dressing post. The correction of this error resulted in an immediate and striking fall in the mortality among these cases.

The principle of early and continuous immobilization of fractures was thereupon firmly established and continuity of treatment became the slogan which guided the Medical Corps in its method of handling severe lesions of bones and joints. Splints were devised or adapted which represented in outline at least the mechanical means for permanent treatment of fractures and these splints were rapidly supplied to the advanced zones as well as to the hospitals farther from the line. A patient dressed with one of these splints completes his journey from the front to the Base Hospital in that appliance and perhaps goes on to full convalescence in the identical splint with which he was fitted in the front line trench.

The broad principles of fixation have not changed with the war. Splinting and traction furnish us with the only methods outside of surgical procedures. The differences in the application of these methods are merely such as increase the simplicity and speed of their use.

The value of splints for use in the zone of the advance must be judged for their

1. Efficiency.
2. Simplicity.
3. Adaptability for
   a. Easy access to wounds.
   b. Facility in transportation.

The efficiency of a splint must be equal to the best of the splints known in civil practice; that is, it must immobilize as completely as is possible; it must be comfortable; it must be both easy and quick to apply. The rough treatment that splints receive when shipped and the considerable strain they undergo during the transportation of patients requires a sturdy construction and the best of materials. Time is of the utmost importance in the overwhelmingly heavy work often encountered during hard fighting.

The simpler an efficient splint can be made, the greater is its value in war surgery. Splints must be manufactured in very large quantities; they must be packed and shipped in numbers. Economy of material and shipping space is essential. There should be no loose keys or wrenches to be lost, no screw threads to rust or mechanical adjustments to get out of order. Frequently bearers or unskilled assistants must apply them and there should be no complicated principles involved in their mechanism.

Adaptability should be considered at the

front for the sake of minimizing the variety of splints. The more injuries for which a single type of splint may be used the more adapted it is for front line and transport duty. The wound, moreover, should be easily accessible so that the splint need not be disturbed when dressings are done.

It has been stated that the enemy are using plaster of Paris splints for much of their transport work. This material has been tried and largely discarded by both the French and British armies. The various drawbacks will readily present themselves. It is bulky to transport compared with metal splints; it is slow of application, soils disgustingly with wound secretions, is not very strong or durable when put on under the stress of front line work; it is heavy and rather hard to remove and in case of secondary hemorrhage presents a real obstacle to the ligature of vessels when necessary.

Metal or wooden splints are now used by both the British and French armies as splints for front line work and transport, and those enumerated in the following list meet the requirements of efficiency, simplicity and adaptability for use in advanced areas. They are selected from among the many splints in common use by military surgeons and are all of proved value. Moreover, they are all useful in hospitals as well as in field work, which obviates the duplication of types. The list is inclusive and will suffice for the immobilization of any type of wound, but it is not exclusive, as there are many good substitutes of proved efficiency.

They are classified in groups adapted to wounds of the various regions of the body. The description of their application is made as brief as possible, emphasis being laid on minor principles important in advanced work and often differing from hospital methods.

It must never be forgotten that war wounds are more often multiple than single. This is due to the extensive use of high explosives. Methods described for single wounds will be impossible to carry out, and the surgeon's ingenuity must be taxed to adapt the dressing to the individual emergency.

A. *Wounds of the Upper Extremity.*

1. Hand and forearm. (Straight or coaptation splints of sheet iron or wood).

The sheet iron splints, when obtainable, are the most convenient. They are already padded with felt and may be bent or twisted to conform to the shape of hand and arm. The 20 inch size is long enough to cover the extensor surface of the arm and reach beyond the tips of the fingers; the 12 inch or 16 inch sizes fit the flexor surface.

If the supply of splints is sufficient, it is always well to use two, posterior and anterior, as better fixation can be secured and there is less danger of the dressing becoming too tight from swelling of the arm. This danger is an ever present one in the dressing of fresh wounds. Swellings may progress rapidly, and many unexpected delays may postpone redressing.

Adhesive plaster is often not available and it is well to learn to depend on strips of bandage tied about the splints to hold them securely with adequate pressure. A gauze bandage completes the dressing. The arm should be supported in a sling during transport.

2. Elbow, Arm and Shoulder Joint.

a. Thomas traction arm splint.

b. Jones humerus traction splint.

a. *The Thomas splint* is used in cases serious enough to require transport by stretchers. The sleeve of the soldier's blouse should be cut off and his wound dressed. Fixation is aided by traction. For rapid work this traction is secured by making a clove hitch about the wrist with a doubled length of three inch gauze bandage. The clove hitch should be applied with the bight about the back of the wrist and the knot on the palmar surface to avoid compression of the vessels and to keep the hand extended. It is a better hitch than a slip knot, which tightens uncomfortably when traction is applied and may cause dangerous constriction.

*Technic*: A definite technic should be acquired in attaching the traction bands to the splint. This saves time, makes a more secure and better looking dressing and one easier to take down at the Evacuation Hospital. Always keep firm traction on the arm. Carry one extension band over an upright, the other under the opposite upright. Then wrap the ends in opposite directions half around the notched cross-piece of the splint. Apply the desired amount of traction by pulling on the traction bands. Complete the wrap about the cross-piece and tie in a square half bowknot. Further traction may be secured by twisting the traction bands with a nail or bit of stick on the principle of the Spanish windlass.

Cross slings should be tied across the uprights under the arm to give it support and a bandage should be applied evenly about the splint and arm.

The uprights of the splint should not press at any point on the wound or any part of the arm.

The axilla should be well padded with cotton to bear pressure from the ring of the splint.

The hand should not be covered by the bandage as it must be watched for evidence of constriction by the traction hitch about the wrist.

b. *Jones humerus traction* splint is used for wounds above the elbow, particularly ambulatory cases. The wound should be dressed and the axilla padded. Short lengths of bandage are fastened across the horizontal part of the splint for forearm support. A clove hitch extension is then applied to the wrist. Downward traction is made on the humerus by a broad bandage carried over the flexed forearm as near as possible to the elbow and fastened below to the extended part of the splint. Backward and forward supports are supplied for the upper arm by cross pieces of bandage tied to the uprights to correct alignment of the humerus. Light traction is made on the forearm to aid fixation. The arm is bandaged and a sling and circular applied. Coaptation splints may be applied about the arm dressing before fitting the traction splint. They are unnecessary, however, and complicate the dressing.

B. *Wounds of the Lower Extremity.*

1. Tarsus and Forefoot.

*Jones Rectangular Foot Splint.* The rectangular splint is small, easy of transport and will partly immobilize the foot for transport. It should be used only in wounds distal to the ankle joint. Many of these travel well without any splint, if protected by a bulky dressing of cotton wool and bandage. The Jones long leg splint may be used whenever the rectangular splint is indicated. The latter may be of great service, however, in double wounds of ankle and thigh when it is used in combination with the Thomas traction leg splint. It is applied by means of adhesive or gauze straps and bandaged firmly to foot and leg.

2. Foot, Ankle and Lower Leg.

a. Posterior leg splint with coaptation splints.

1. Wooden posterior splint.
2. Cabot posterior wire splint.

b. Jones combined ankle and lower leg splint.

a. *The posterior leg and side splints* give the best fixation for comfortable transport in lower leg and ankle wounds. The drawback to this dressing is that it requires three separate splints. However, a posterior splint should *never* be used without side splints. It gives no lateral retention and the leg often rolls quite off the splint in transport.

The important points in the application of this splint are the alignment of toes and patella, the right angle position of the foot, adequate padding under the knee and the lower leg above the heel to prevent pressure. The foot should be secured firmly to the foot piece and well padded lateral splints should be bound on tightly enough to prevent rotation. If adhesive is available, it is well to suspend the foot from the extremity of the foot piece by means of a wide strip of plaster applied to the sole but not carried under the heel.

b. *The Jones combined ankle and lower leg splint* may be applied outside the clothes. However, dressing of the wound requires their removal, as a rule. The single posterior upright should be bent to fit the curves of the limb. The foot piece should support the ankle at right angles and the curve of the splint below the heel should be sufficient to clear the heel and avoid all danger of pressure. The sheet iron posterior bands should be bent upwards to fit the thigh and calf.

The splint is rapidly applied and easy to pack and transport. However, it fails to immobilize the leg completely because of the lack of lateral support, as the posterior pieces are not broad enough, particularly if the limb is covered with large dressings. This objection may be overcome by adding side splints, in which case it has little advantage over the older type of posterior leg splint. Recent improvements in the splint have largely overcome this difficulty. Folded blankets placed beside the leg on the stretcher make the splint more effective, acting like sand bags to prevent rotation. It must always be borne in mind that splints in transport are subject to unusual jars and strains which call for a broad margin of safety in their efficiency.

3. Knee and Thigh.

*Thomas Traction Leg Splint.* This is the most useful of all splints for wounds of the lower limb. In addition to knee and thigh

wounds, for which it is especially well adapted, it serves for a lower leg dressing by the addition of coaptation splints or the Jones rectangular splint. It may also be used in many cases of hip joint wound where injury to soft parts is such that a bearing surface for the ring is intact. The splint can be applied very simply over the clothing.

*Application.* Without moving the leg, the breeches are cut in front from knee to hip and then half way round at the groin and knee. The leg is examined and the wound carefully dressed. Traction is then applied outside the shoe. The *best* method is always the *simplest* in the trenches. Adequate and comfortable traction can be secured with a bandage, which is always at hand and therefore most strongly recommended. Various ingenious substitutes have been suggested and employed, and are worthy of mention. A screw eye may be inserted in the heel of the boot; a nail or skewer may be pressed through the shank of the shoe and cords attached to its projecting ends; a horseshoe shaped wire with inward facing prongs can be hooked over the welt of the shoe on both sides and a traction cord be attached to the ring of the horseshoe. These methods demand special articles sure to be lost or mislaid, while bandage traction is always available.

The technic of the application is important. Take a double length of four-inch bandage a yard and a half long. Place the middle of this traction band back of the shoe just above the counter. Wrap both ends across the instep and round under the sole in the usual figure-of-eight manner. Bring each end up on its respective side and carry it under the lateral part of the bandage behind the malleolus, then over this bandage and directly downward, thus providing two lateral traction bands. The loops should be well back of the malleoli so that the line of traction is behind the ankle joint. A generous pad should be placed over the instep beneath the crossing of the bands to prevent pressure. It must be borne in mind that grave injuries of the leg interfere with its circulation and that pressure sores develop from incredibly slight trauma.

Slip the Thomas splint on gently and fit the ring well at the ischial bearing. Carry each traction band half around the corresponding uprights, passing one over and one under its upright, and then bring each one in opposite directions once about the notched iron piece at the lower end of the splint and tie with square half bowknot. A nail or bit of wood slipped between the bands below where they have been brought about the uprights may be twisted as in a Spanish windlass to increase the traction at will.

The cut flaps of the breeches leg are brought over the uprights and pinned to give the proper support. Should safety pins not be available, cut holes in the breeches flaps and insert lacings to be crossed under the splint and brought around and tied on the front of the thigh. Cross strips of bandage are tied to the uprights to support the leg. A wire foot piece attached to the uprights serves to support the foot at right angles. Sling the foot to the top of the support by a half hitch about the instep and bandage around boot and foot piece.

A bandage about the whole splint completes the dressing. For speed, this may be applied from above downward, as there is no danger of constricting the limb with a bandage carried outside the uprights of the splint.

A coaptation splint is often used as a posterior splint to increase the support of the thigh. This is desirable but by no means necessary, as the dressing as above described gives adequate and comfortable support.

Transfer to the stretcher. The stretcher should be provided with a heavy splint support which springs on to the side bars. The patient should be carefully lifted on to the stretcher by four bearers. The end of the splint should be slung to the cross bar of the splint support by a bandage, so that the leg clears the stretcher, and also tied to each upright of the splint support to prevent side sway.

4. *Hip and Pelvis.*

A. Long Liston Splint.

B. Straight "bed slat" splint.

A. *The long wooden Liston splint* is a modification of the "bed slat." It has an offset piece of wood carried on angle irons to avoid the prominence of the hip and buttocks and to give opportunity for dressing the wound. It also has an adjustable foot piece, making the splint reversible for use in either limb. It is applied outside the clothing and before moving the patient by means of a swathe or wide bandage about the trunk, and straps and bandages about thigh, leg and foot. Triangular bandages are useful for both swathe and thigh bandages.

B. *The "bed slat" splint* is a simple straight board preferably 4 or 5 inches wide, extending from the axilla to below the sole of the foot. It must be padded liberally opposite trunk and limb to avoid too much pressure over the pelvis.

5. *Spine, Cervical, Dorsal, Lumbar.*

There is no splint commonly used for wounds of the spine. If a Bradford frame is available, it is well to get a patient on it at once to avoid moving him again. To do the dressing, it may be necessary to turn him on his face. Be as gentle as possible, and always have three or four men move him and caution him not to try to help himself. *Cut* off the clothing. Dress the wounds. Prepare a stretcher with folded blankets corresponding to the normal curves of the back. In cervical injuries, keep the neck slightly extended. In dorsal injuries, extend moderately by blanket under the shoulder blades. Some steadying support may be secured by putting traction on both legs attaching the bands to the uprights of a splint support fastened to the stretcher. Counter traction may be quickly secured by a head sling made from two doubled 2-yard lengths of four inch bandage, the middle of one passed under the chin and the ends brought up in front of the ears: the other, in front of the chin and the ends crossed under the occipital protuberance brought forward and both bandages tied together at the sides of the head just over the temporal region. The two bands may be fastened to the handles of the stretcher, the apparatus serving to steady the patient during transport.

## Clinical Department.

### ULTRA-VIOLET LIGHT FOR BOILS: A CASE REPORT.

By John Bryant, M.D., Boston.

Since antiquity, boils have not ceased to afflict humanity, and boils have caused much misery, especially in those individuals particularly subject to them. The great number of proposed cures testify to such a lack of adequate treatment that it seems worth while to record a case in which a strikingly successful result was obtained by the use of the quartz lamp.

Mr. O., aged 66, had for many years suffered from boils. On May 29, 1917, he was seen in the morning, and it was incidentally observed that the left side of the nose was very red. On the evening of the same day Mr. O. reported for treatment of the nose condition. By this time the entire left side of the nose was fiery red and decidedly painful, and according to past experience the outlook was for several days of disability. It was determined to try the quartz lamp. A local exposure of five minutes at a distance of 20 cm. was given. The next morning it was evident that decided improvement was already in progress. A second similar exposure of ten minutes was given, followed the same evening by a third exposure of fifteen minutes also at a distance of 20 cm. This completed the treatment. No more was needed, as the threatening boil had disappeared, leaving in its stead merely a skin area reddened by the lamp. Two days later the nose was normal except that the skin was peeling from the effects of the light, but at the urgent request of the patient a precautionary exposure of twenty minutes was given. There was no recrudescence of the furuncle. Mr. O. was enthusiastic.

#### SUMMARY.

In an elderly gentleman subject to boils, a very formidable looking furuncle on the nose was caused to disappear in twenty-four hours as a result of three brief exposures to ultra-violet light from a quartz lamp.

The simplicity and celerity of the method was appreciated by the patient. An agent which can accomplish such a result should be more widely known and used in the treatment of an affection which, if not serious, is a frequent cause of pain and disability.

New England to Supply 1958 More War Nurses.—In the campaign which the Red Cross is conducting to enlist 27,000 nurses by January 1, the Atlantic division, composed of New York, New Jersey and Delaware, leads in actual enrollment. Of the allotted 5708, 45 per cent., or 2600, have been enrolled, leaving 3108 to be secured. The New England States have assigned 1360 nurses, or 41 per cent. of their allotment, with 1958 nurses still to be recruited.

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ERNEST GREGORY, *Manager*,
126 Massachusetts Ave., Corner Boylston St., Boston, Massachusetts.

## EXPERIMENTS WITH POLIOMYELITIS.

THE United States Public Health Service has recently issued Bulletin Number 111, which contains four interesting articles dealing with myelitis and poliomyelitis. The first article, by N. E. Wayson, discusses the pathology and pathogenesis of myelitis. "A review of the studies on the pathology and pathogenesis of myelitis show that the various hypotheses as to the genesis of its different forms have strongly supportive evidence, but no theory carries an overwhelming amount of this evidence. There seems to be, from the anatomic-pathological viewpoint, no reason for great dispute, since the various histological changes are seen in the different types of the condition, apparently dependent upon the rapidity of the process, in turn dependent upon the virulence of the infectious material for these structures. The localization in the cord seems dependent upon the mode of entrance and probably upon a specific factor (trauma in transverse myelitis). Extension through one or another system of the cord lends itself readily to the explanation afforded by anatomical structure."

The second article, by J. P. Leake, dealing with experimental poliomyelitis, describes experiments with virus of human origin obtained during epidemics, one in New York and one in Virginia, and with material from domestic animals associated with cases of human poliomyelitis. The uniformly positive results following the inoculation of material from New York cases was unusual, and their interpretation difficult. "Possibly they signify high virulence of the epidemic; or they may be due to the use of 100 per cent. glycerin for preserving the virus. The virus has shown classical infectivity on passage through a series of monkeys, and has been filtered through both Berkefeld and Chamberland filters. Attempts at infection by way of the nasal and alimentary tracts were unsuccessful, though possibly immunity was produced once by the latter method. The neutralization test with this virus was shown to be of questionable value. Infection with the winter strain (West Virginia) of poliomyelitis protected against the 1916 summer strain (New York). The serum of a horse treated with the virus of poliomyelitis produced no demonstrable immunity in monkeys. None of the paralyses in domestic animals, such as are so frequently reported during an epidemic of poliomyelitis, were shown to have any relation to the disease in people."

Another series of experiments, attempting to induce poliomyelitis in small laboratory animals, is described by A. M. Stimson. No evidence was adduced by these experiments to show that rabbits, guinea pigs, or rats are susceptible to poliomyelitis. Other observers have reported the successful infection of rabbits and guinea pigs with poliomyelitis. As this method did not differ essentially from those described in this article, the author believes that the discrepancy must be attributed to one or other of the following causes: either the strain of virus employed differs in its pathogenic properties, or it is contaminated with some organism capable of producing these symptoms in small animals.

Attempts to cultivate the virus of epidemic poliomyelitis have been described by N. E. Way son. The technic of Noguchi and Rosenow is

explained. Numerous diplococci and streptococci have been cultivated from the spinal cords and brains of human and monkey subjects which showed, clinically and histologically, the findings in acute epidemic poliomyelitis. None of the organisms cultivated reacted in the small laboratory animals or in the monkeys with clinical or histological evidence of the disease. The attempt to reproduce Noguchi's and Rosenow's results was negative, though involving approximately 700 cultures and 300 animal tests.

## ENROLLMENT OF NURSES.

In another column of this issue of the *Journal*, we have published an appeal "To Physicians of America." The attention of physicians is directed to this appeal and to their responsibility in aiding to release nurses for war service. In order to secure 25,000 graduate nurses by January 1, many nurses must be withdrawn from civilian practice, and those who remain must be utilized as far as possible for public health service. It is the duty of physicians to conserve nurses for positions of utmost usefulness, by relieving them from office duty, employing them only when skilled attendance is indispensable, and by urging patients either to go to hospitals or to employ public health nurses. Sending nurses to the front means increased work for physicians who must maintain public health at home, but let us make this personal sacrifice and encourage our nurses to render their services to those who need them most, the fighting men in France.

## VOLUNTEER MEDICAL SERVICE CORPS.

Attention of physicians is earnestly directed to the statement, published in another column of this issue of the Journal, explaining the purposes and plans of the Volunteer Medical Service Corps. Blank forms of application for membership in this Corps have been distributed, and every doctor who has not already filled out and made his return, should do so without delay. It is a duty which he owes to the dignity of his profession as well as to his country.

## MEDICAL NOTES.

Buffalo Department of Health.—The annual report for 1917 of the Buffalo Department of Health shows the lowest death rate for a number of years and a birth rate substantially increased. The number of deaths due to typhoid fever has been relatively the lowest in the history of the city. The work of the Medical School Inspectors increased to such a degree that twenty-five Medical School Examiners and twenty-one nurses were needed, instead of the original number of five examiners and one nurse. The Open Air School system has been established wherever possible, by coöperation with the school department. The divisions of infant welfare and child labor have been carried on efficiently. The great decrease in infantile intestinal disturbances may be attributed to the educational methods adopted by the food inspection department. Among the most important innovations was the inauguration of five Health Centers, which care for the needs of their respective localities. The problems of social hygiene and housing have presented numerous difficulties to the Health Department. At the present time, Buffalo's hospital facilities offer 973 beds available for patients requiring treatment. Detailed statistics and tables are included in the report.

### WAR NOTES.

Dorchester Doctor in Army Medical Corps.—Dr. Carleton E. Allard of Dorchester has been commissioned a lieutenant in the medical corps and will leave soon to begin training for overseas duty at Camp Dix, New Jersey.

Lieutenant Frank MacGregor Honored for Bravery.—Lieutenant Frank Harrison MacGregor, of the United States Medical Service, attached to the Seaforth Highlanders, has been decorated by the British for conspicuous bravery. According to the official citation, he "displayed the greatest devotion to duty. Three hundred casualties passed through his aid post established in the open on July 23. Although orderlies and attendants were killed all around him, he continued attending to his medical duties and the example he set won the admiration of all ranks. The conduct of this officer during the whole operations was exemplary and merits the highest award."

MEDICAL PROMOTIONS.—Brigadier-General Merritte W. Ireland, in addition to thirteen other officers of his rank, has been promoted to the rank of major-general, and nominated for assistant surgeon-general.

SLOVAKS UNDER RED CROSS CARE.—The Red Cross war council has been advised by cable from Vladivostok that more than 20,000 Czecho-Slovak refugees, 4000 of them children, are being cared for by the American Red Cross at that point.

The cablegram also contained the statement—important in view of the efforts of the Bolsheviki government at Moscow, to make it appear that there are no armed German or Austrian prisoners threatening the Czecho-Slovak in Siberia—that the Red Cross medical organization at Vladivostok is also attending hundreds of wounded Czecho-Slovak soldiers "who have reached Vladivostok after weeks of the most desperate fighting against the pro-German forces."

The condition of the refugees, who were found living in tents and freight cars along the Chinese eastern railway west of Harbin, was pitiable. A majority of them are farmers, though there are many coal miners and railway employees in the number, people who were driven from their homes by the Bolsheviki and the German and Austrian war prisoners.

The work of ministering to the wounded Czecho-Slovak fighters, who have steadfastly refused to recognize the Bolsheviki-German peace, and relieving the distress of the homeless civilians was started the moment their plight was brought to the attention of the Red Cross. The relief work was directed by Charles K. Moser, American consul, and head of the Red Cross chapter at Harbin. Red Cross chapters at Tokio and Shanghai gave valuable aid. While waiting for instructions from America, they went ahead and raised funds in Vladivostok which provided temporary relief for both soldiers and civilians.

On the authorization of the American Red Cross, Dr. R. B. Teusler, head of St. Luke's Hospital at Tokio, hurried to Vladivostok with necessary hospital supplies and perfected a medical organization to care for the incoming wounded soldiers. This organization, now complete from a medical and sanitary standpoint, consists of a base hospital with a bed capacity for 200. One rolling canteen, two sanitary trains, one field first-aid unit and a disinfecting train, will also be available for the American and allied soldiers now in Vladivostok or on the way through. There are now in active service with this unit 14 American and seven Japanese doctors and 15 American and 17 Japanese nurses. All the American doctors are volunteering their services. Dr. Teusler hopes to enlist 30 additional American doctors and 50 American nurses in the Orient.

WORCESTER PHYSICIAN IN SERVICE.—Doctor A. E. P. Rockwell, of Worcester, Massachusetts, is serving as Contract Surgeon on the Neuro-psychiatric Board at Camp Custer, Battle Creek, Michigan.

MEDICAL MEN GIVEN CROSSES FOR HEROIC SERVICE.—Distinguished Service Crosses have been awarded by General Pershing to the following medical men of the American Expeditionary Forces for acts of gallantry:

Private Fred Gunn, medical, infantry: "At the battle of Cantigny, 28-31 May, he repeatedly, on his own initiative, left the security of the trench to administer first aid under fire and in full view of the enemy snipers and machine gunners. His brave conduct was a noble example, and his ministrations relieved suffering and saved lives."

Private John When, medical, infantry: "For three nights at Cantigny, on 28-31 May, he worked unceasingly under fire, bringing the wounded to safety and ministering to them on his own initiative. He repeatedly left shelter to help wounded men."

NAVY HOSPITAL SHIP DELAYED.—The Navy hospital ship Comfort, which was to have sailed without convoy or guns, with flags flying by day and lights blazing at night, has been delayed. The Germans have been sinking hospital ships as plainly marked as the Comfort was to be, and the Navy Department has thought it unwise to send it out protected only by the righteousness of its mission.

Officially the reason for the failure of the Comfort to sail is that no necessity has arisen that demands her presence in the war zone. The Navy has had few wounded and these have

been accommodated in various hospitals abroad.

There is plenty of accommodation for any who must come home on the returning transports, which during the week ending Aug. 23, landed 423 wounded and sick soldiers in the United States.

BOSTON AND MASSACHUSETTS.

WEEK'S DEATH RATE IN BOSTON.—During the week ending Aug. 31, 1918, the number of deaths reported was 192, against 217 last year, with a rate of 12.76 against 14.65 last year. There were 45 deaths under one year of age, against 46 last year.

The number of cases of principal reportable diseases were: diphtheria, 31; scarlet fever, 5; measles, 13; whooping cough, 22; typhoid fever, 14; tuberculosis, 51.

Included in the above were the following cases of non-residents: diphtheria, 4; scarlet fever, 1; whooping cough, 2; typhoid fever, 1; tuberculosis, 8.

Total deaths from these diseases were: diphtheria, 3; whooping cough, 5; tuberculosis, 17.

Included in the above were the following non-residents: diphtheria, 1; tuberculosis, 2.

SALEM HOSPITAL BEQUEST.—Under the will of the late Jasper R. Pope of Beverly, Mass., $25,000 are bequeathed to the Beverly Hospital.

## Miscellany.

### VOLUNTEER MEDICAL SERVICE CORPS.

THE COUNCIL OF NATIONAL DEFENSE authorizes the following statement:

Many thousands of blanks for enrollment of the legally qualified men and women physicians of the country in the reorganized Volunteer Medical Service Corps are being mailed by the chairman of the General Medical Board of the Council of National Defense. With the blank are enclosed a letter and a folder giving all details as to the organization.

The blank which applicants are asked to fill out reads:

APPLICATION FOR MEMBERSHIP IN THE VOLUNTEER MEDICAL SERVICE CORPS AUTHORIZED BY COUNCIL OF NATIONAL DEFENSE, APPROVED BY THE PRESIDENT OF THE UNITED STATES.

(Space for date, full name, street, city and state addresses.)

1. Date of birth.
2. Place of birth.
3. If foreign born, when did you become a resident of the United States?
4. When and where naturalized? How?
5. Are you single, married, widowed, or divorced? Nationality? Color? Height? Weight?
6. State high school, academy, college, or university you have attended, with dates of attendance, graduation, and degrees received.
7. Give all literary or scientific degrees you have received and names of institutions granting them, with dates.
8. With what languages or branches of science are you familiar?
9. When and where graduated in medicine?
10. When and where licensed to practice medicine?
11. Name principal medical societies of which you are a member. (Do not abbreviate.)
12. What specialty of medicine do you practice?
13. Proportion of time devoted to specialty?
14. Clinical experience in specialty? Institution? No. of years?
15. State all past hospital services. Hospital? Capacity? Date.
16. Present hospital connections. Hospital? Department? Capacity?
17. School and teaching positions occupied in the past. School? Capacity? Date.
18. School and teaching positions now occupied. School? Department? Capacity?
19. State all past experience in industrial or railroad medicine and surgery. *Name and address of plant. Type of service* (whether medical, surgical, occupational diseases, accident work, contract practice for families of workmen, etc.) *Duration of service.*
20. State all present connections with industries or railroads. *Name and address of plant. Type of service* (whether medical, surgical, occupational diseases, accident work, contract practice for families of workmen, etc.) *Time devoted to each plant.*
21. State military, naval or public health experience you have had.
22. Are you a Federal, State, County or Municipal officer? (State exact designation of your office.)
23. Are you engaged in enterprises other than medicine? If so, what?
24. Have you followed any occupation, medical or otherwise, not already noted?
25. Have you previously been an applicant for entry into the United States Service? When? Where? Result? (If rejected state why.)
26. I have not applied for appointment in the Medical Reserve Corps of the Army, the

Naval Reserve Force, or the Public Health Service owing to ..... (Check reason).

(*a*) Physical disability. (State disability in detail.)

(*b*) Over age (55). (State age in years.)

(*c*) Essential institutional need. Name of institution. Position. Name and address of chief executive.

(*d*) Essential community need. Approximate population. Number of physicians now practising in your community.

(*e*) Essential to health department. Name of department. Position. Name and address of chief of department.

(*f*) Essential to industries. Name of plant. Position. Name and address of chief executive.

(*g*) Essential to medical school. Name of medical school. Position. Name and address of dean.

(*h*) Essential to local or medical advisory boards. Name and address of board. Position.

(*i*) Dependents. Number of dependents, including self but not employees. What proportion of your income or that of your dependents is derived from sources other than the practice of your profession? Do other persons contribute to the support of your dependents? Have you or your dependents other immediate relatives who could provide support for your dependents.

(*j*) Sex. (State your sex.)

(*k*) Religious conviction, not a citizen, or other reasons. (State reason.)

27. Are you available for any of the following services:

(*a*) Consultant. Medical service. Surgical service. Public Health Service. Special service—What?

(*b*) Institutional. Laboratory. Administrative. Medical service. Surgical service. Special service—What?

(*c*) Medical service for industries. Part time. Full time. Own community. Other communities. Kind of work.

(*d*) Local or medical advisory boards.

(*e*) Reclamation of registrants rejected for physical unfitness.

(*f*) Services to needy families and dependents of enlisted men.

(*g*) Sanitation.

(*h*) Miscellaneous service.

28. Check the governmental service in which you would prefer to serve if selected.

(*a*) Medical Reserve Corps of the Army.

(*b*) Naval Reserve Force.

(*c*) Public Health Service.

NOTE—Wherever practicable your preference will be given consideration. However, the exigencies of war may render it necessary to ask you to do service other than that indicated as your choice.

29. Personal references. (Name three, at least one physician.)

I hereby make application for membership in the Volunteer Medical Service Corps of the United States. I certify that, to the best of my knowledge and belief, the answers to the preceding questions are true and correct in every respect. I pledge myself to abide by the rules and regulations of the Corps; to apply for a commission in the Medical Reserve Corps of the Army, the Naval Reserve Force, or for appointment in the Public Health Service when called upon to do so by the Central Governing Board; and to comply with any request for service made by the Central Governing Board.

(Signature) .....

(Present post-office address) .....

An outline of the purpose and scope of the Volunteer Medical Service Corps, contained in the folder, is as follows:

VOLUNTEER MEDICAL SERVICE CORPS ORGANIZATION

1. Provides means for obtaining quickly men and women for any service required.
2. Furnishes recommendations and necessary credentials to assure the best of medical service, both military and civil.
3. Determines beyond question the attitude of the individual toward the war.

OBJECT OF CORPS.

1. Placing on record all medical men and women in the United States.
2. Aiding Army, Navy and Public Health Service in supplying war medical needs.
3. Providing the best civilian medical service possible.
4. Giving recognition to all who record themselves in Army, Navy, Public Health activities, or civilian service.

WORKING PLANS.

All matters pertaining to the organization will be under the direction of a Central Governing Board, authorized by the Council of National Defense and approved by the President of the United States, and its affairs will be conducted from the general headquarters of the Volunteer Medical Service Corps at Washington, D. C., under the Council of National Defense.

OPERATING SYSTEM.

1. Central Governing Board of 25.
2. Forty-nine State executive committees.
3. One representative in each county in every State.

NOTE.—(*a*) All men to be appointed to State and county committees preferably over 55.

(*b*) Each State executive committee to consist of five in the smaller States and one additional member in each of the larger States in proportion to each 1000 medical inhabitants (to be nominated by State committees, Medical Section, Council of National Defense, from among their own members).

(*c*) Each county of 50,000 population or under should have one representative. All count-

ies having over 50,000 population should have one additional county representative for each 50,000 population or fraction thereof. All county representatives to be nominated by the State executive committee.

DUTIES.

*Central Governing Board.* To receive and pass upon all appointments.

*State Governing Boards.* To receive facts from county representatives and make recommendations to Central Governing Board.

*County Representatives.* To submit facts to State Committees according to advice from Central Governing Board or State Executive Committees.

Under the reorganization, every legally qualified physician, man or woman, holding the degree of Doctor of Medicine from a legally chartered medical school, who is not now attached to the Government service, and without reference to age or physical disability, may apply for membership and be admitted if qualified; whereas, the original organization admitted only those who, for various reasons, were ineligible to membership in the Medical Reserve Corps. The organization will mobilize the medical profession in order to provide for the health needs of the military forces and the civil population, and the recording and classifying of doctors will afford means of obtaining quickly men and women for any service required.

To date about 40,000 of the 144,116 doctors in the United States—not including the more than 5,000 women doctors—either are in Government service or have volunteered their services. Up to July 12, the Surgeon-General had recommended to the Adjutant-General 26,733 doctors for commissions in the Medical Reserve Corps. About 9,000 others who applied were rejected. With the 1,194 in the Medical Corps of the National Guard and 1,600 in the Navy, the total —37,527—constitutes 26.73% of the civilian doctors. Deducting those who declined their commissions or who have been discharged because of subsequent physical disability or other cause, the number actually commissioned in the Medical Reserve Corps stands (August 23) at 23,531, with several hundred recommended whose commissions are pending. Of the 23,531 there are 22,232 now on active duty.

The need of using wisely the service of the medical men, in view of the universal war activities, is indicated when it is known that in the five weeks ended August 2, there were 2,700 medical officers commissioned in the Army, Navy, and Public Health Service—or at the rate of 540 per week. This rate at which enrollment is proceeding is the cumulative result of the operation of all the machinery which has been in process of setting up since the United States entered the world war. While the number commissioned in the five weeks mentioned may seem large, it is not much greater than the rate at which medical men have been receiving their commissions during the past year. There are now 28,674 medical officers commissioned in the three services—26,027 in the Army, 2,427 in the Navy, and 220 with the commission of Assistant Surgeon in the United States Public Health Service. Of the 2,700 commissioned in the five weeks ended August 2, there were 2,527 in the Army, 169 in the Navy and 4 in the United States Public Health Service. Also, 40 doctors designated as Acting Assistant Surgeons have been taken on in the Public Health Service in the last two months, 21 for work in extra-cantonment zones, 14 for special venereal disease work, and 5 for marine hospitals. The 26,027 in the Army medical service comprise 933 in the Medical Corps, the regular Army service; 23,531 in the Medical Reserve Corps; 1,194 in the Medical Corps of the National Guard, and 369 in the Medical Corps of the National Army.

It is estimated that at least 50,000 doctors will be necessary evenually for the Army. It can readily be seen that with the enrollment of these active men, their places in communities and institutions must be cared for and the work, therefore, throughout the country must be so systematized and coördinated that the civilian population may not suffer. An important aspect is the need for medical men in the communities where munitions and other vital war products are being made.

The Volunteer Medical Service Corps, supervised by the Central Governing Board now named, will thoroughly care for these needs.

In connection with the mailing of membership blanks for the Volunteer Medical Service Corps to all legally qualified men and women doctors of the country, Dr. Franklin Martin, Chairman of the General Medical Board of the Council of National Defense, says:

"Great as has been the response to the appeal for doctors, it must be greater. It is imperative that every doctor not already in a Government service fill out, sign and return the blank to the offices of the Central Governing Board, Council of National Defense, Washington, at once. We believe thousands will do this, as they are anxious to be enrolled as volunteers for the medical departments of the Army and Navy before registration under the new draft law goes into effect. The appeal for enrollment in the Volunteer Medical Service Corps, which President Wilson has formally approved, is an official governmental call to service. This will place the members of the medical profession of the United States on record as volunteers, available for classification and ready for service when the call comes."

## Correspondence.

### ANTIVACCINATION AND TWO OTHER CRAZES.

Westport, Essex County, New York,
August 28, 1918.

*Mr. Editor:*—

I agree entirely with the editorial of Dr. Samuel B. Woodward in your issue of August 15, 1918, on the subject of antivaccination. The craze of the antivaccinationists is of the same order, although worse in its effects, if they were, alas, to succeed, than the two other crazes which are also rampant at the present time—I mean national prohibition and New York State narcotic drug law. The former is, to me, an almost unmixed evil, as I have tried to show more than once, but without, apparently, much good effect. My views, briefly, about the latter are shown in my letter, recently published in the *New York Evening Sun*. I trust you may forcibly and favorably comment upon its purport and thus help re-establish sane legislation upon a matter which affects nearly every practitioner of medicine and not a few of the greatest sufferers from disease or accident.

BEVERLEY ROBINSON, M.D.

### CHILDREN'S PAVILION OF SHARON SANATORIUM.

Boston, Sept. 6, 1918.

*Mr. Editor:*—

May I ask you to call the attention of the medical profession to the fact that the Children's Pavilion—a recent addition to the work of the Sharon Sanatorium at Sharon, Mass.—is now ready for occupancy. It is a combined school and sanatorium for children between seven and fourteen years whose parents are of *very moderate means*, and it is intended to receive cases in the early stages of pulmonary or glandular disease, or anemic, debilitated children of suspected tuberculous tendency. It is not intended, as a rule, for surgical cases. The charge per week is moderate and utterly inadequate to meet the outlay, and the institution is largely dependent upon the public for support, as it has been for the 27 years of its existence, during which time it has received women of limited means only. It should be distinctly understood that the sanatorium is intended for the people who stand between the well-to-do and the very poor,—often the hardest class to reach. The State is now making earnest endeavors to receive the increasing number of soldiers who are tuberculous. The Sharon Sanatorium has already received the wives of soldiers and doubtless before long widows and orphans will be applicants. The new pavilion offers special advantages to the latter for treatment and instruction. It is earnestly hoped that the medical profession will avail themselves of the advantages of this modern institution, founded through the generosity of philanthropic people.

Application for admission should be made to the Superintendent, Dr. Walter A. Griffin; and for children to Dr. Henry I. Bowditch, 28 Bay State Road, Boston; or to myself.

Very truly yours,
VINCENT Y. BOWDITCH,
506 Beacon Street.

### REGISTRATION IN MEDICINE.

Boston, September 4, 1918.

*Mr. Editor:*—

At the time the Legislature passed the law requiring physicians to register with city or town clerks, many practitioners in this State were very much disturbed, and violently denounced the law and criticised the proponents of this measure.

The Supreme Court of Iowa, in the case of Lynch *vs.* Kathmann *et al.* (Ia.) 163 N. W. R., 408, not only sustains the constitutionality of a similar law, but presents cogent reasons why the requirement is a reasonable regulation.

Some States require yearly registration of physicians, and where this plan has been adopted it has been found to be of value in providing approximately up-to-date information of the number and location of physicians in such States.

Physicians in this State should realize that our law was made as simple and free from burdensome features as possible, but should also understand that no physician can legally conduct practice until local registration has been attended to, and, furthermore, they cannot compel the payment of fees without meeting this requirement of law.

There may be some who have omitted complying with this requirement and who may be unwittingly liable to prosecution and loss of income, for the Directory of the American Medical Association gives the names of a considerable number of physicians not reported by the cities and towns.

It is to be hoped that there will be no further need of calling attention to this matter in order to secure compliance with this law.

Respectfully,
WALTER P. BOWERS, *Secretary.*

### SOCIETY NOTICES.

WORCESTER DISTRICT MEDICAL SOCIETY.—Regular meeting, 4.15 P.M., Wednesday, Sept. 11, 1918, in G.A.R. Hall, 55 Pearl Street, Worcester.

Address by Dr. Perley P. Comey, Augusta, Ga. Subject: "A Northern Physician's Work in the South."

Fellows will please note that this Society, by vote at the last annual meeting, sanctioned the charge of $3.00 for day calls in this city and a proportionate advance in office and other fees, and similar action in localities where a lesser fee has been in vogue. Uniformity of action herein is asked of the Fellows.

GEORGE A. DIX, *Secretary.*

SPRINGFIELD ACADEMY OF MEDICINE.—The first meeting of the year 1918-1919 will be held on Tuesday evening, September 10.

Report of case: "Congenital Pyloric Stenosis," D. F. F. Dexter.

Address: "The Treatment of Cardiac Disease as Influenced by the Complete Examination by Modern Methods," Dr. Louis S. Bishop, New York.

Discussion opened by Dr. E. A. Bates, "Internist's Viewpoint"; Dr. F. B. Sweet, "Surgical Aspects." General Discussion.

Meeting begins at 8.30 sharp. Please be prompt.

DR. L. D. CHAPIN, *Secretary.*

### RECENT DEATH.

WILLIAM EDWARD EMERY, M.D., of Beverly, M.R.C., died of meningitis at Fort Ogelthorpe, Ga., June 11, 1918, aged 28 years.